amateur radio

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MARCH, 1969

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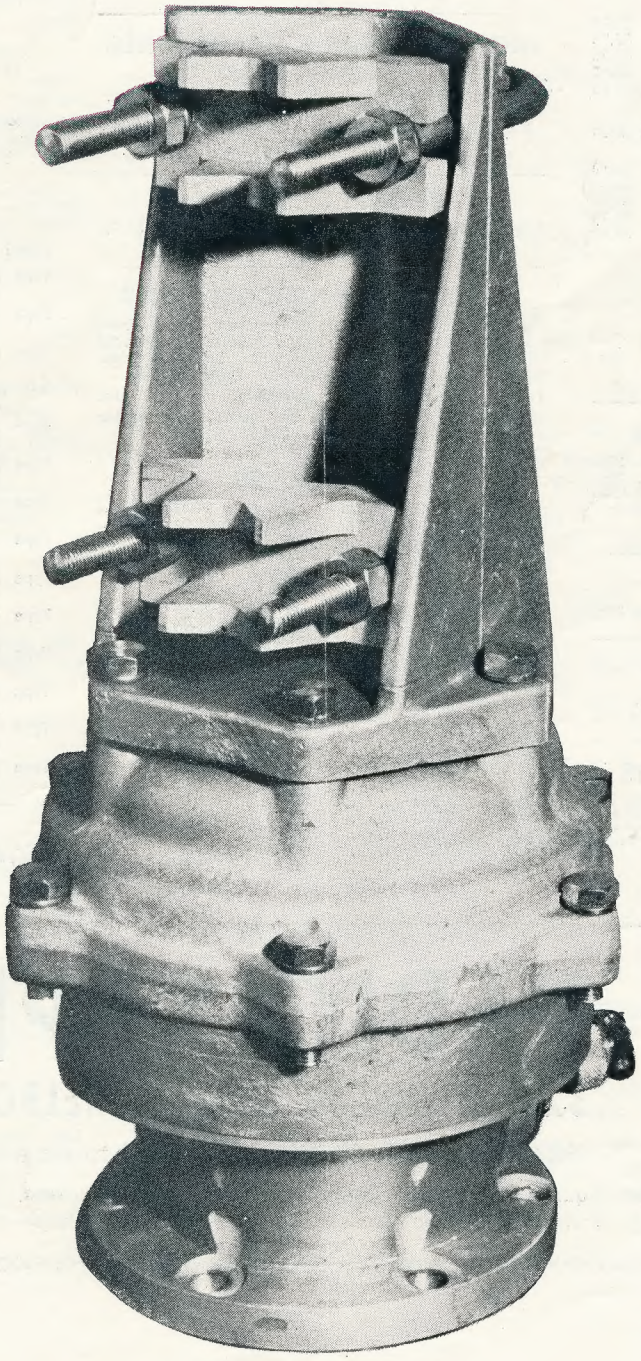

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50-0-50 uA.	$5.75	1, 5, 10 A.	$3.75
100 uA.	$5.40	15, 30 A.	$4.50
100-0-100 uA.	$5.50	15 volt d.c.	$3.75
500 uA.	$4.00	30 volt d.c.	$3.75
1 mA.	$3.75	300 volt a.c.	$4.25
5, 10, 25, 50, 100, 250, 500 mA. ..	$3.75	1000 volt a.c.	$4.50

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		"VU" Meter	$8.25

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100 uA.	$5.75	25 volts d.c.	$5.50
500 uA.	$5.25	300 volts a.c.	$5.50
1, 5, 10, 20, 50, 250, and 500 mA.	$5.00	"S" Meter	$5.75
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1S4	$2.22	,, ,,	6BR5	$1.12	,, ,,
1S5	$1.35	,, ,,	6BW6	$1.42	,, ,,
3S4	$1.35	,, ,,	6BX7GT	$2.22	,, ,,
3V4	$1.35	,, ,,	6CM5	$1.65	,, ,,
5A54	$1.05	,, ,,	6CW5	$1.08	,, ,,
5Y3GT ..	92c	,, ,,	6CW7	$1.22	,, ,,
6AD8	$1.08	,, ,,	6DQ6A ..	$1.65	,, ,,
6AE8	$2.88	,, ,,	6GW8	$1.31	,, ,,
6AL3	$1.18	,, ,,	6L6	$3.52	,, ,,
6AN7	$1.22	,, ,,	6M5	$1.00	,, ,,
6AN8	$1.89	,, ,,	6N3	88c	,, ,,
6AQ5	$1.03	,, ,,	6R3	$1.18	,, ,,
6AR5	$1.68	,, ,,	6S2	$1.42	,, ,,
6AR7GT	$1.44	,, ,,	6SQ7	$1.96	,, ,,
6AU4GT	$1.18	,, ,,	6V6GT ..	$1.35	,, ,,
6AU6	$1.05	,, ,,	6X4	75c	,, ,,
6AV6	90c	,, ,,	9A8	$1.50	,, ,,
6BA6	$1.08	,, ,,	9U8	$1.35	,, ,,
6BD7	88c	,, ,,	12AU7A	$1.12	,, ,,
6BE6	$1.09	,, ,,	12AX7 ..	$1.25	,, ,,
6BH5	$1.05	,, ,,	80	$1.15	,, ,,

All above Valves plus 25% Sales Tax

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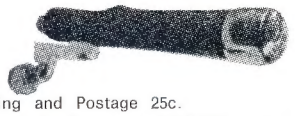

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Type F498: 1-0-1 mA., blank scale, 3 in. square, mounting hole 2¾ in. Price $3.75.

Type F499: 1-0-1 mA., blank scale, 4¼ in. square, mounting hole 3¼ in. Price $4.25.

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Type F490: 50-0-50 uA., blank scale, 2¼ in. square, mounting hole 1¾ in. Price $4.00.

Type F491: 50-0-50 uA., blank scale, 3 in. square, mounting hole 2¾ in. Price $4.50.

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amateur radio

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★

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CONTENTS

Page

Technical Articles:—

An Experimental 455 Kc. I.F. Strip 5
Project—Solid State Transceiver, Part Five 8
The W5OMX Communications Receiver 11

General:—

Book Review:
Electronic Circuit Design Handbook 6
Ham Radio Projects 6
Radio Communications Handbook 6
104 Easy Transistor Projects You Can Build 6
Correspondence 19
"CQ" SSB Award Rules 19
DX 20
Federal Awards 17
Federal Comment 4
Federal Notes 21
New Call Signs 18
New Equipment:
Log Periodic for 6-2 Metres 17
Motorised Antenna Rotator 17
Panoramic Display Unit 17
Versatile AC Bridge 17
Prediction Charts for March 1969 16
Silent Key 21
The Questionnaire—Some Further Progress 7
VHF 20
W.I.C.E.N. Exercise by VK3 North-Western Zone 17

Contests:—

Contest Calendar 19
"CQ" World Wide WPX SSB Contest, 1969 19
1969 I.A.R.C. Propagation Research Competition 19

COVER STORY

Antennas are increasingly in the news these days and our front cover this month shows the working end of a new rotator from Bail Electronic Services. Development of these devices has been such that models like the "Emotator" 1100M, designed with push-button control, are within the economic range of most Amateur uses.

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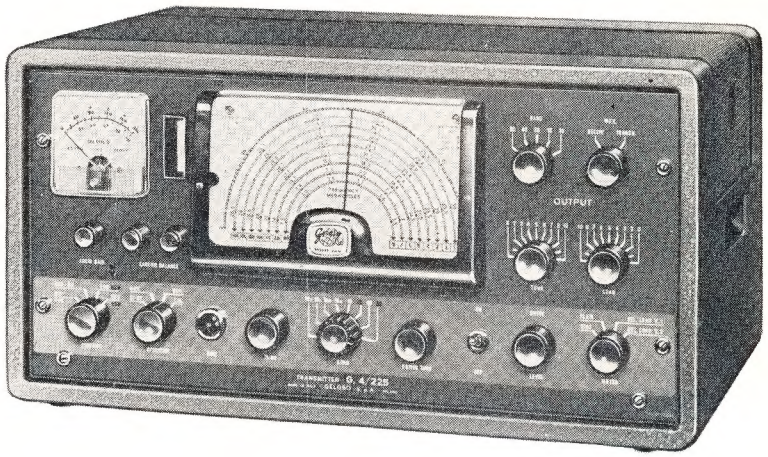
Model G4/225

A complete Transmitter that gives an Amateur all the facilities for modern communications for CW, SSB, DSB, and AM modes.



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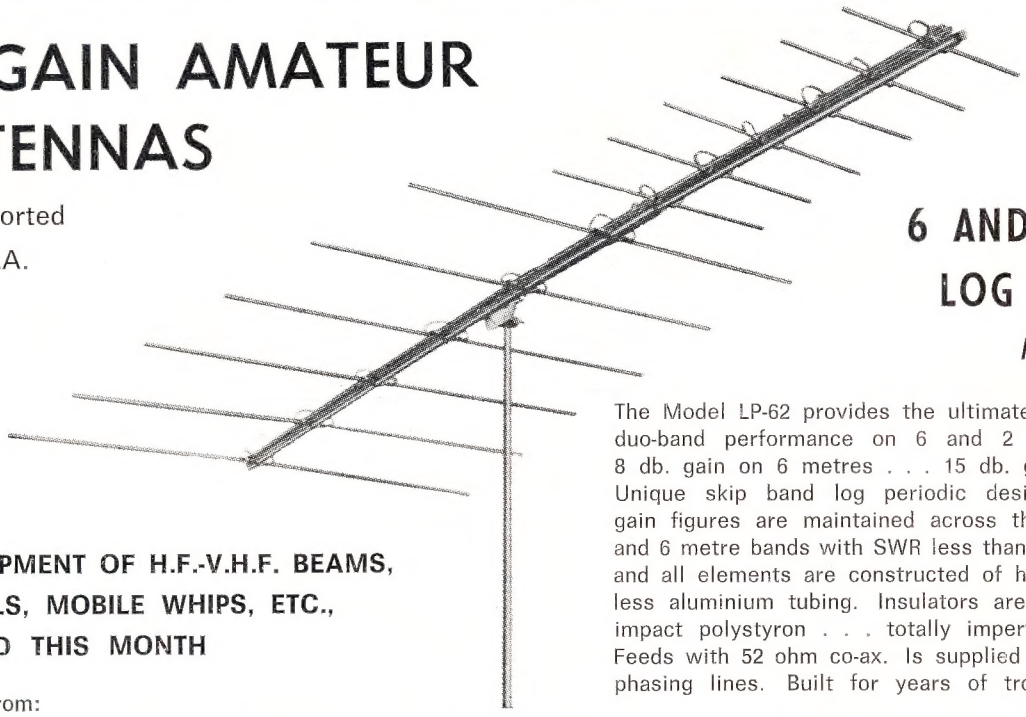

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Unwanted sideband suppression is 45 db., carrier suppression 60 db., and distortion products are down approximately 30 db.

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The transceiver comes complete with AC and DC input cords, and carrying handle; thus making it the most versatile and portable set on the market, and certainly the best possible value.

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FEDERAL COMMENT

About 1,000 copies of this issue of "A.R." are being sent out as complimentary copies — perhaps you, the reader are one of these 1,000. This came about because a few months ago the Magazine Committee decided to include a Questionnaire soliciting information about the magazine and Amateur Radio generally; they also asked "is there anyone to whom you would like a complimentary copy sent?" They were overwhelmed with replies and now have a tiger by the tail!

We hope you find favour with this "house journal" of the Wireless Institute of Australia.

If you are an advertiser you may be interested in the circulation. This magazine reaches nearly 5,000 Amateur Radio operators or people with an associated interest in radio. These are radio "hobbyists," but they are also consumers of many non-related products, and in an estimated 38% of cases they are in positions of responsibility in the electronics industry, or telecommunications, or other related occupations. They are united through their hobby, not through being similarly employed, therefore this journal is, we believe, a unique medium for reaching a diverse group of consumers. In the U.S.A. an estimated 49% of Amateurs are engaged in radio communication, and other electronic and electrical engineering, according to the Stanford Research Institute report of 1967.

So, we suggest, you may care to use our W.I.A. journal to bring before our members information about your products. The support of advertisers is necessary for this journal's continued survival and conversely the supporting of our advertisers is a must as far as we, the Amateurs, are concerned. We should show preference in our purchasing for products regularly advertised in our journal.

If, however, you are not an advertiser, but a non-member Amateur Radio operator who has received this copy as a result of a friend's request for a complimentary copy to be sent to you, then what's in it for you?

Firstly, we hope the editorial material (the technical articles, the notes of Amateur Radio activities, etc.) is of interest to you; secondly, we hope you consider the work being done by Australia's Amateur Society, the W.I.A., is appreciated by you as shown by your support and membership. Two things then are to your benefit—the receipt of a well-produced magazine, and the maintenance of your hobby, through your support of its Society.

Should you merely wish to receive the magazine, then twelve copies at 30 cents each is $3.60, direct subscription. However, you can receive the magazine at a lower cost per copy—at present 17 cents, but this will cost you a bit **more** than $3.60! How's that again? Put it this way, subscriptions to the W.I.A. vary from State to State, and vary from grade to grade, and range for full members (licensed operators) from $8.00 in Victoria to about $5.00 in some other States, but all are considerably above the $3.60 for 12 copies of "A.R." Why pay more to receive the magazine?

Because, I believe, if you can see your way clear to be a member of the W.I.A. rather than just a direct subscriber to its journal, you give support to its efforts to "represent the Amateur Service". You also support the activities of a large band of enthusiastic honorary officers. (W.I.A. has no fully-paid officers, and honoraria are rare. The editing and production of this magazine are done by voluntary labour, the major costs being paper, printing and postage. Its cost to members is 17 cents a copy.)

Where do the extra few dollars go? How is this W.I.A. organised? There are six States or **Divisions**, each autonomous, and you pay your sub. to your "Division". Each Division, irrespective of size, carries one vote at the annual Federal Convention where Federal policy is determined. One Division (Victoria), in addition to running its own Divisional affairs, provides the personnel for an independent Federal Executive body to implement decisions of Federal Council. The Victorian Division, in addition, assumes responsibility for publishing this magazine on behalf of the Federal body.

Say for argument that your sub. is $6.00 p.a. Of this, 17 cents $\times$ 12 = $2.04, goes to the publishers of "A.R." magazine; also about $1.00 goes to Federal Executive of W.I.A. So about $3.00 of your, say, $6.00 is remitted from your Division's funds, the remainder is retained in your State for its administration. The $1.00 to F.E. is made up as follows: 30 cents per member is the annual "per capita" fee, 20 cents per member will be recovered starting this year so that Australia can pay its dues to the Region III .organisation of South-East Asian and Oceanic Amateur Radio Societies. The other 50 cents odd (it's been about 47 cents per member on the average over recent years) is used by Federal Council through Executive to finance the annual meeting of delegates from the six Divisions.

The mechanism of this "50 cents odd" calculation is that air fares, accommodation and meals over the Easter period for six delegates and three members of Executive, are placed in an account, stirred around, and the total is divided up between States according to membership. All members of the W.I.A. contribute the same to the cost of the Convention, but the total paid by larger Divisions is, of course, greater. The effect of this procedure is that the travel costs of delegates from States far from the Convention venue are subsidised by States close to the venue. As the Convention is held in rotation around the States, this to a degree evens out over the years. (This year the Convention is in Canberra, next year it is expected to be in Perth.) However, all W.I.A. members pay the **same** per capita fee of 30 cents, they pay the **same** Region III. contribution of 20 cents, they pay the **same** share of Convention costs of about 50 cents, they pay the **same** price for "A.R." of 17 cents $\times$ 12 = $2.04. So the cost of "Federal" activities and administration is the **same** for all members, about $3.00, irrespective of where they reside. The difference between $3.00 and your actual sub. is the cost of maintaining your State W.I.A. organisation and paying for its administration.

You may care to contact your Divisional Secretary and enquire about membership and subscription, or you may care to send the application form published as an insert to this issue. But only do this if you would like to spend a few dollars a year extra to support your Amateur Society. You may like to support us if you're pleased that you can become a licensed Amateur at 15 now, you now only have to pass 10 w.p.m. c.w., you now can use 400 watts p.e.p. s.s.b. output, you can now go portable or mobile for five days without prior permission, you can now officially use unmanned v.h.f. repeaters under certain conditions, and because you can, in short, enjoy quite liberal operating conditions.

The gaining of those privileges and others over the past few years has been because your society is held in high regard by the administration, and because it represents (just) over 50% of Amateurs. Very soon we may have to "represent the Amateur Service" very strongly in reference to v.h.f. frequency spectrum allocations. It would be a great source of strength if we represented 60% or 70% or **all** Amateurs, active or inactive.

Are you a long-time member? Then please show this to a friend who is a call sign holder, but inactive. He may like to receive the magazine. Please note, however, that for all of you, the direct subscription to the magazine will cost less than W.I.A. membership, but is the saving really worth it?

John Battrick, VK3OR

AN EXPERIMENTAL 455 Kc. I.F. STRIP

E. MANIFOLD, VK3EM*

ONE would think that by now everything that could be written about i.f. amplifiers would have been covered in some way or another, but it seems that there are still ways of using available units to produce better results, any information available not having been circulated to any extent. There is nothing new in the fact that ceramic filters can be used in i.f. stages, having been done many times, but to date very few designs have used them in cascaded stages utilising the double ring-dot type of resonators.

Where these filters have been used in cascaded stages practically no information has been given as to the passband selectivity, except one article[1] (also Ref's 2 and 3) did mention that "good skirt selectivity with reasonably square flat-topped response" was available.

To original thoughts and queries on this subject, no answers were readily available, but in line with tuned circuit characteristics where by increasing the number of cascaded stages, a narrower bandpass and steeper skirt selectivity is produced, particularly at frequencies of 50-100 Kc., it was thought that similar results could be produced by cascaded ceramic filter stages.

Looking at the selectivity curves for "Murata" SF455D ceramic filter units in single stages (Fig. 4), shows that the peak of the curve is reasonably sharp and is adjustable over fairly wide limits with different coupling condensers, but the skirt selectivity leaves much to be desired, definitely not satisfactory for a communications type receiver by modern standards.

All the foregoing thoughts had been provoked by the fact that Ric Hill, VK3RC, had made available several SF455D and BF455A "Murata" ceramic filter units from I.R.H. Components Pty. Ltd. for experimental purposes. Unfortunately, the project has been delayed due to the pressure of other duties and has only now become a reality.

A p.c. board was laid out and prepared with parts assembled to the circuit of Fig. 1, using NPN germanium transistors, only because these were at hand, although other circuits for these filter units show silicon transistors as being used, as in Fig. 3, which should be low to medium gain types to avoid instability.

For this reason no resistor values have been shown on Fig. 1 for base and emitter bias resistors as they will vary, depending on the type of transistor used, and as it does not affect the final result to any extent they were not included.

As this was an experimental set-up, no a.g.c. circuitry was included, the main consideration being the selectivity, stability and gain of the strip, using the "Murata" ceramic filter units and by-passes for three stages of i.f.

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It was realised at the outset that each filter unit may, or may not, be exactly the same frequency at 455 Kc., but it was hoped that the spread over the three units would not be excessive, and proved to be an average centre frequency of 454.8 Kc. for the experimental strip, for these three units.

VARYING THE COUPLING

When first assembled the coupling condensers between pins 1 and 2 on each filter unit were all 25 pF. on the assumption that it would produce a curve at 2 Kc. bandwidth, similar to the published curves for a single stage (Fig. 4), but with steeper skirt selectivity.

Certainly the skirts were much steeper but the nose of the curve was also much sharper (curve No. 4, Fig. 2) and was only suitable for c.w. operation, being approx. 0.6 Kc. at the 6 db. point and 2 Kc. at the 40 db. level, the limit of measurement at this location.

Single signal selectivity indeed, as by a listening test, placing the b.f.o. on either side of the i.f. passband only half of the signal was copiable, the other sideband being just audible when tuning over the signal.

Unfortunately this is where the difference in each filter unit becomes noticeable, as the curve plotted for this arrangement was slightly asymmetrical due to the different frequency of one unit.

The next test was to go to the other extreme and fit 150 pF. condensers in place of the 25 pF. condensers across pins 1 and 2 of the filter units, the result being indicated by curve No. 1 Fig. 2 with a 4.5 Kc. bandpass at 6 db. and 8.5 Kc. at the lower extreme.

This was considered as being too broad for the present s.s.b. requirements, so the 150 pF. condensers were replaced with 100 pF. condensers to produce curve No. 2 (Fig. 2) which, while very good for a.m. operation, was

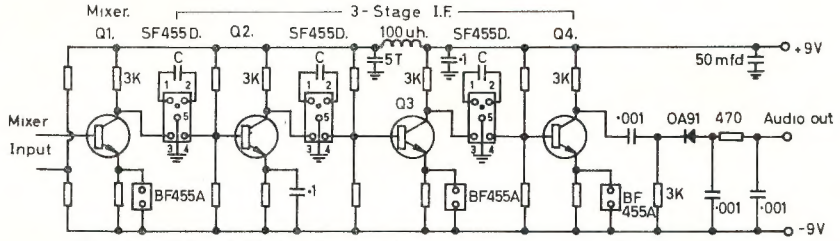

FIG. 1. CIRCUIT OF CERAMIC FILTER I.F. STRIP

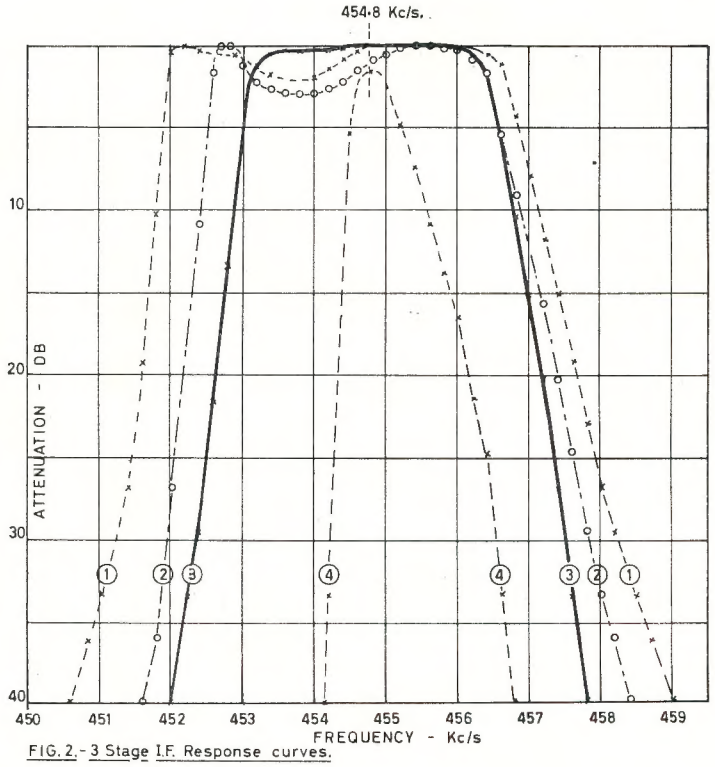

FIG. 2. - 3 Stage I.F. Response curves.

not the best it was felt necessary for in a good communications receiver.

Consequently, the coupling condensers were replaced again with 50 pF. in the first stage, 56 pF. in the second stage, and 50 pF. in the third stage, only because these were the only ones of this value available at the time. Curve No. 3 (Fig. 2) resulted from this variation, which was considered to be a fair compromise for both a.m. and s.s.b. operation for the receiver.

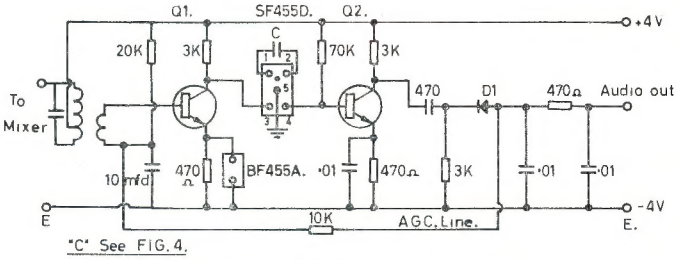

FIG. 3. "MURATA" CERAMIC FILTER CIRCUIT. (as supplied.)

All previous curves with the larger condensers gave a dip in the top of the response curve, but the 50 pF. combination gave what was essentially a flat-topped response curve with steep sided skirts.

LISTENING TESTS

For listening tests a receiver front-end was capacitively coupled from the mixer plate with a few pF. to the "Murata" ceramic filter i.f. strip, which was followed by an audio amp. and speaker, to give alternative listening either through the normal receiver or through the new i.f. strip and audio stages, using the audio volume controls to mute either receiver while tuning a signal.

For the initial test a strong b.c. station was tuned at approx. 1500 Kc., mainly because there would be no fading to confuse the test.

Tuning the main receiver on the strong b.c. station with the 7 Mc. dipole for the antenna, the bandspread on the receiver was greater than 10 Kc. and was still audible at 15 Kc. from either side of resonance. This was not so good, but was indicative of most older communication type receiver response to strong signals on any band.

The ceramic filter unit was then turned on and the same tuning done again, which confirmed the result obtained by curve No. 3 of Fig. 2. The difference being that over modulation was noted, or overloading in the i.f. strip, I wonder, surely b.c. stations do not splatter—or do they?

Weak stations 10 Kc. away from the strong b.c. station could be copied with the ceramic filter, which were inaudible with the main receiver i.f. in circuit.

CONCLUSIONS

In conclusion, it is felt that this experimental unit is a simple, inexpensive approach to upgrading an existing receiver and obtaining a narrow bandwidth response i.f. strip which requires no alignment but may require adjustment to get the desired bandpass, is stable, and is in keeping with the requirements of the selectivity of a modern receiver. While it may not be quite as good as the mechanical or crystal filter units, neither is it as costly nor space consuming as the whole i.f. strip is approx. 4" x 2" with room to spare.

My thanks to Ric Hill, VK3RC, for the samples of the "Murata" ceramic filter units and bypass units for the test, and to Harold Hepburn, VK3AFQ, for his support and interest in the project.

The "Murata" SF455D and BF455A ceramic units are available from Ham Radio Supplies, 323 Elizabeth Street, Melbourne, Vic., 3000.

ADDENDUM

Perusal of "Coryra" publication for January 1969 shows that Roger Davis, VK1RD, has been doing parallel work on these "Murata" filter units, as he has published a preliminary report for an i.f. strip to be used in a project receiver for that magazine.

No circuitry was given, but from the report, the results mentioned appear to be similar to the response curves of Fig. 2.

A complete i.f. strip was to be published for February with p.c. board and parts available for subscribers to "Coryra" only.

REFERENCES

1. R.S.G.B. Bulletin: "A FET Receiver for VHF Bands," by A. L. Mynett, G3HBW, Dec. 1967, p. 796.
2. Radio Communications (R.S.G.B.): "The G3LUB Brief Case Portable," by D. R. Bowman, G3LUB, Mar. 1968, p. 158.
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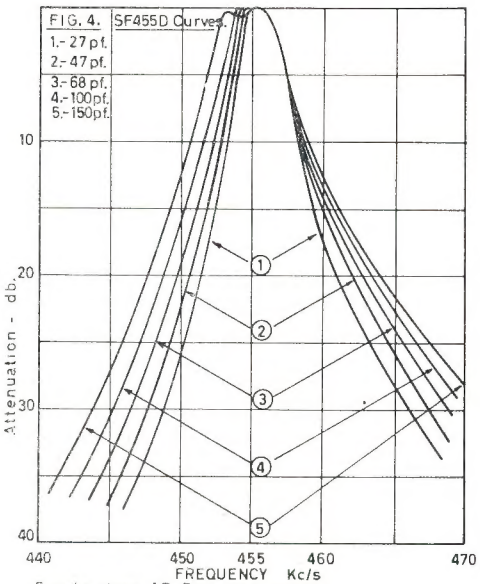

Single stage I.F. Response curves.

Book Review

RADIO COMMUNICATIONS HANDBOOK

Published by R.S.G.B.

This book is the fourth edition of the ever popular R.S.G.B. Handbook, now with a new title and a greatly enlarged content, containing 21 chapters and some 800 pages. This edition represents a very considerable advance on the preceding one and is more than 50% larger.

There is a completely new chapter on r.t.t.y., incorporating a considerable amount of information on the Creed teleprinter (the most common unit available to Australian Amateurs). Most other chapters have been rewritten and enlarged to include new information on receivers, transmitters and aerials with extensive information on propagation phenomena. U.h.f. techniques are comprehensively covered.

We anticipate this publication will find its way onto most Amateurs' bookshelves as well as many professional libraries.

Our copy direct from the publishers.

HAM RADIO PROJECTS

Bert Simon, W2UUN

This book contains 104 projects, all of which fall into the simple and cheap category, indeed many are quite basic one and two-tube rigs, relatively easy to assemble and operate. In the author's own words, "If you have a well stocked junk-box, you should be able to build many of these projects for just the cost of a few capacitors and resistors."

In addition to numerous tube configurations, there is a fairly extensive grouping of semiconductor devices using the latest in transistors, however prime emphasis has been placed on cost.

The sections of the book cover antenna devices, audio devices, c.w. helps, interference suppressors, pre-amps. and pre-selectors, receivers and converters, receiving accessories and transmitters. These are projects for all bands from 3.5 to 1296 Mc., but some basic knowledge of construction and layout is definitely needed, as in the main they are limited to a schematic drawing, list of parts, and barest essential details for construction, although some useful wiring hints are included, mainly for the higher frequency projects.

Published by TAB Books, U.S.A. Price $US3.95.

ELECTRONIC CIRCUIT DESIGN HANDBOOK

Second Edition, by Editors of EEE Magazine

This publication is aimed more at the professional engineer than at the Amateur operator, although the more advanced Amateur will find much of interest. The 320 pages (11 x 8½ inches) contain a wealth of information, over 500 circuits with 600 illustrations. The accurate and clear circuit descriptions are supplemented by easy to follow diagrams which contain all component values and other needed data.

The contents cover: Control circuits, regulator circuits, protection circuits, filter and suppression circuits, amplifier circuits, oscillator circuits, pulse circuits, counting and timing circuits, gating and logic circuits, and many others too numerous to list here.

Not a cheap book, but worthwhile to the seriously interested in electronics.

Published by TAB Book Co., No. T-101. Price $US14.95.

104 EASY TRANSISTOR PROJECTS YOU CAN BUILD

Bob Brown, K2KSQ

Published by Tab Books, U.S.A.

This is a brand new circuit/project book for hobbyists, experimenters, amateur technicians, in fact any one with an interest in electronics. Some of the projects are not applicable to Australia, in fact would be likely to land the constructor in trouble with the powers that be. However, there is still much of interest to the Amateur and experimenter, especially those with an interest in gadgetry.

Using no more than three or four transistors (often only one or two), the projects reflect the many recent advances in solid stata technology. A number of the devices employ field effect transistors and silicon controlled rectifiers. A complete schematic diagram of each device is included, along with a parts list, plus a brief description of its operation and application.

Our copy direct from the publishers, price $US3.95 plus postage.

THE QUESTIONNAIRE – SOME FURTHER PROGRESS

Before proceeding with further analysis, we would mention that a few late replies have arrived, sufficient to raise the over-all return to 31.2% a little under a 1% increase. A few trial runs showed that the extra replies made practically no difference to the figures already compiled, hence it was decided not to re-work the vast number of calculations already made. These late returns have been retained in order that the comments included in them may be taken into consideration at a later stage of our investigations.

The subject of readers' requirements took a considerable amount of "crystal gazing" as comments left some answers in doubt. These we have classified as "maybe". Some made no attempt to answer the question, so have been omitted from the figures.

The summary gives us the following table:

	Yes %	No %	Maybe %
Technical articles	98.3	1.3	0.4
DX Notes	47.5	51.5	1.0
VHF Notes	52.5	46.2	1.3
Federal Notes	60.0	23.4	16.6
Divisional Notes	50.5	45.5	4.0
SWL Notes	23.4	75.5	1.1
Trade Reviews	71.5	27.9	0.6
Book Reviews	59.0	40.5	0.5
Correspondence	61.5	36.8	1.7

In VK1-2, VK5-8 and VK7, the majority did not want the DX Notes, while in VK3 exactly the same number voted for as did against. The other two Divisions had a majority in favour of DX Notes by only very narrow margins.

In VK4-9 and VK7 the majority voted against the VHF Notes, again the margins were very small, being less than 2% difference.

All States voted in favour of Federal Notes, and some most enlightening comments were included. In due course, these comments will be extracted and forwarded to the Federal Executive for their consideration and action where thought necessary.

The Divisional Notes appear to be the strongest bone of contention. As the table shows, the voting was fairly even, so much so that in VK3 and VK4-9 the "no" majority made it by only one vote. VK7 were also against, but by a wide margin. The most frequent comment by those in favour, stipulates the Divisional notes should not be in the old form, but should be restricted to items of general interest, such as reports of meetings and future activities, with personal "pars" eliminated. Those against, in the main, consider that all Divisional matters are best left to Divisional bulletins and broadcasts.

No State favoured SWL Notes and the only surprise in this section was the noticeable lack of support by the SWLs and Associates themselves. Many with call signs, although indicating SWL Notes should be included, indicated they had no personal interest themselves, but felt they would be of use to others. On this matter, we will have more to say later, when we review the many comments in more detail.

All States except VK7 are in favour of Trade Reviews, only 33% of their votes being in favour. Many interesting comments were made regarding the types of review, and these will be taken into consideration later.

VK6 voted against Book Reviews by a margin of 3%, while all other States were in favour by fairly high margins. VK7 was again the odd-man out on the subject of correspondence with a 3% majority being against the correspondence section.

Readers' preferences appear most interesting and more work has to be done on this matter. As far as we have gone, we find the first choice to be:

VK1-2	Antennas
VK3	Receivers
VK4-9	Receivers
VK5-8	Receivers
VK6	Transmitters
VK7	Receivers

On an Australia-wide basis, the first choice figures are:

Antennas	25.4%
Audio Equipment	0.9%
Hints and Kinks	11.9%
Receivers	26.6%
Test Equipment	12.5%
Transmitters	22.5%

As to how we finally evaluate this information and how best to use it, has yet to be decided, but for certain, we will not be wasting space on audio equipment, unless it is strictly orientated towards Amateur Radio applications.

As far as the question on advertisement perusal is concerned, there is no point in making any calculations. Well under 1% would have indicated they did not read them, and possibly under 5% only look at some of them. This matter has been commented on at great length in the "any other suggestions" portion of the questionnaire. Some suggestions are completely impracticable, but this was only to be expected. However, we did find some wheat amongst the chaff, and we have already acted on some of the sound suggestions received. Some of the suggestions we would like to act on, and in these cases we can only pass them to the advertisers for their consideration. To all those who adversely commented on certain advertising material, we can only draw attention to the fact that we had already taken action on this matter at the time the questionnaire was published, and such type advertising has not appeared in recent months.

A point frequently raised is the lack of advertising from the "smaller" States. This is a matter that has been raised at Federal Conventions for many years when attention has been drawn to the Federal Policy Book, item M06, which states:

"That there shall be appointed in each Division a sub-editor of 'Amateur Radio' who will be responsible within the Division for—

(a) Collation of Divisional Notes.
(b) Procurement of technical articles.
(c) Furthering the circulation of the magazine within his Division.
(c) Collaborating with the Publications Committee in increasing the volume of advertising in the magazine."

This policy item was framed back in 1947 and after 22 years has never been taken seriously by any Division, therefore any complaints regarding lack of advertising from certain States should rightly be directed to the Council of the State concerned for their action.

The whole matter of advertising is a complex one and it may help if some few details are clarified. There is the impression that advertising is a highly profitable operation for the magazine. While there is some profit in it, it is not large. In setting advertising rates, factors such as circulation and likely return for the expense must be considered, as well as production costs. In an earlier report, we gave estimates of the national level of spending on our hobby, and it must be admitted the **average** figure for each Amateur is not high. To encourage more advertisers, we must either spend more individually or increase the number of active Amateurs to increase the size of the market. As the position stands now, we are of the opinion that the new rates we have had operating since January are fair to all concerned.

Literally hundreds of suggestions were received which would improve the magazine, but only by greatly increasing the costs of production. For this reason they cannot be seriously considered at this time, but could be incorporated as part of a long-range programme. For example, a popular suggestion was that the size of the magazine should be the same as "QST" and similar publications. This suggestion has been considered for at least the last ten years, but as it is more expensive than the present size, we cannot make the change. Going through our library, it is noticeable that the American publishers are the main exponents of the smaller format, while the Societies with smaller circulations prefer the larger format. It would appear they also use larger formats for economic reasons.

We whole heartedly agree with all those who asked for photos and descriptions of stations of other Amateurs. Some years ago we did have such a section, but for some reason the supply of suitable material dried up. Odd ones have been directed to us over the years, but very few have been suitable for reproduction. If Divisional sub-editors (????) would like to follow this one through we will go along with it. Two from each Division will keep us going for a year. If we are rushed with offers, publication will be made in State numerical sequence from 2 to 7, one at a

(Continued on Page 18)

PROJECT—SOLID STATE TRANSCEIVER

PART FIVE

H. L. HEPBURN, VK3AFQ, and K. C. NISBET,† VK3AKK*

To date this series of articles has described all of the modules necessary to build the receiver part of the project and some of the modules for the transmitter.

This month's article will be devoted to the power regulation and distribution system and to the signal interconnections necessary for the receiver section to be made operable.

VOLTAGE REGULATION AND DISTRIBUTION

The right hand side of Fig. 14 gives the circuit of the voltage regulator, while the left hand side shows the way in which the various voltage outputs are distributed to modules.

Note that the part of Fig. 14 within the dashed lines contains the components in the regulator module and contained in the regulator kit. The small circles on the left hand side of the dashed "box" are the diagrammatic representation of the pins which constitute the output points on the p.c.b.

The regulator has been designed to accommodate an unregulated input of from 12 to 15 volts d.c. This range was adopted in that it covers the limits met with in mobile operation. It will however continue to function down to 11.5 volts, but not below. If the unregulated d.c. is derived from a mains operated supply, it is recommended that at maximum load (i.e. on transmit) the output voltage from the supply does not fall below 12 volts.

In the usual type of solid state voltage regulator the reference voltage for the base of the regulator transistor (or transistors) is obtained from the unregulated supply by means of a zener diode and a dropping resistor.

This system has two drawbacks. Firstly, the range through which the supply voltage may vary without exceeding the rating of the zener, or getting outside the control range of the zener, is comparatively narrow. To overcome these two problems, the dropping resistor has to be fairly large in value and, as a consequence, the stabilised d.c. output is well below that on the unregulated line. Secondly, the actual voltage at which the zener controls is somewhat dependent on the current flowing through it and thus the regulation of the supply output is degraded.

In the circuit being described, the usual dropping resistor is replaced with a field effect transistor. One characteristic of a FET is that, if connected as a diode with gate joined to source, the current flow through it will be (within wide limits) independent of the voltage drop across it. Thus as unregulated supply varies, the current through the diode connected MPF102 remains constant, the zener current remains constant, the zener control voltage remains constant, and the regulation of the whole supply is improved.

In addition, the lower limit of the unregulated supply range is only a volt or so above the regulated supply output. In the circuit described, the unregulated supply can drop to 11.5 volts while the regulated output is still being controlled at 10.5 volts.

The string of three diodes in series with the 9.1 volt zener are being used as low voltage zeners to bring the stabilised regulator base voltage up to about 10.6 volts.

This, well regulated, control voltage is applied to the base of the 2N3564 regulator/"driver" which in turn controls the output voltage from the emitter of the 2N3055 main voltage regulator. The 1.5 ohm resistor in the unregulated line has been included as a safety measure and limits the current

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† 25 Thames Avenue, Springvale, Vic., 3171.

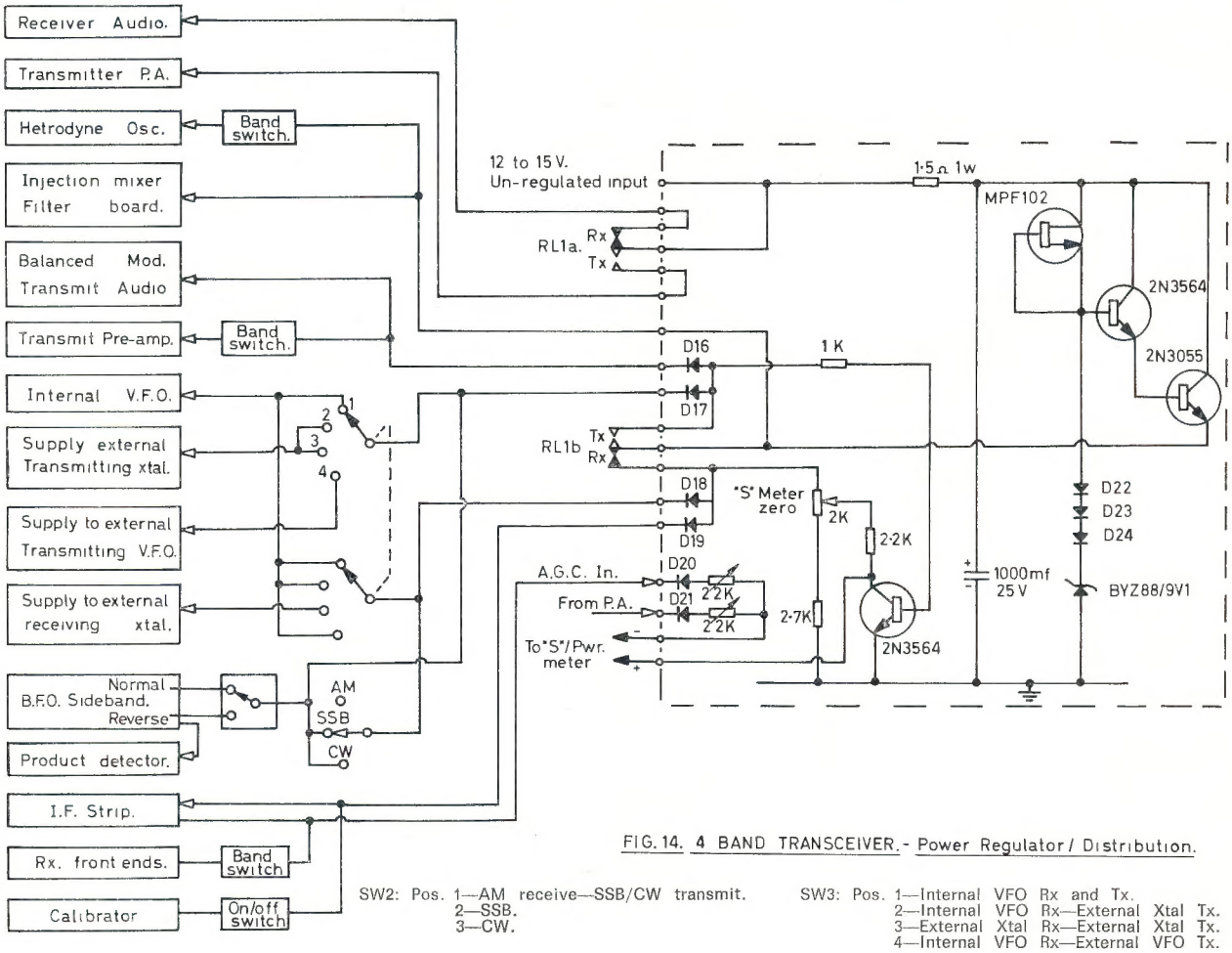

FIG. 14. 4 BAND TRANSCEIVER.- Power Regulator/ Distribution.

SW2: Pos. 1—AM receive—SSB/CW transmit.
2—SSB.
3—CW.

SW3: Pos. 1—Internal VFO Rx and Tx.
2—Internal VFO Rx—External Xtal Tx.
3—External Xtal Rx—External Xtal Tx.
4—Internal VFO Rx—External VFO Tx.

drain in the event of short circuits or component failure.

The 1,000 uF. capacitor across the unregulated input improves both the filtering and the dynamic regulation of the supply.

The rest of the regulator module is devoted to the various change-over, gating and adjustment functions required by the transceiver. They will now be described.

(i) The unregulated supply voltage is applied only to the receiver audio module and to the transmitter p.a. Both of these functions have wide current demands and are best separated from the remainder of the modules in the interests of economy and stability.

RL1A applies unregulated voltage to the receiver audio module when in the unenergised "receive" condition and to the p.a. board when energised through the p.t.t. or other tx/rx switch.

(ii) The injection mixer and filter modules are energised at all times and thus are supplied straight from the regulated output. According to the frequency required, one of the hetrodyne crystal oscillators must be in operation at all times and is thus supplied straight from the regulated line via the band switch.

(iii) The regulated d.c. line is connected to the change-over contacts of RL1B. In the unenergised receive position, voltage is applied to the receive only functions via the gating diodes D18 and D19. At the same time no voltage is applied to the base of the "S" meter switching transistor so that it is open circuit and allows the "S" meter circuit to function. When energised on transmit, the relay contacts apply voltage to the "transmit only" functions through the gating diodes D16 and D17. Voltage is also applied on transmit to the base of the meter transistor switch, pulling it hard on and isolating the "S" meter circuit.

(iv) In the transmit position regulated voltage is applied via D16 straight to the balanced modulator and to the various transmit mixer/pre-amplifiers via the band switch. The line through D17 goes to the two-pole four-way switch which is used to select either the internal v.f.o. or alternative external frequency control facilities. D17 also gates a supply to the b.f.o. at all times.

(v) In the receive condition, D18 gates supply voltage through the internal/external switch to the v.f.o. and to the b.f.o. via the a.m./s.s.b./c.w. function switch. Note that the b.f.o. is always energised on transmit, but **on receive only** it may be made inactive when receiving a.m.

D19 gates supply to the receiver i.f. strip and to the (optional) crystal calibrator on receive. Note that the receiver front-end supplies are obtained from the a.g.c. line via the bandswitch, and that the product detector supply comes from the gating diodes in the b.f.o. (refer to Fig. 12 in Feb. 1969 "A.R.").

The four gating diodes D16-19 are used to prevent transmit functions being energised on receive (and vice-versa) through the interconnections of the internal/external frequency control switch.

(vi) **"S"/Power Out Meter**

The meter used is a simple 0-1 mA. instrument and is used to indicate both the relative strength of the received signal or the relative power output of the transmitter. Change-over switching is automatic.

The meter type in the project is the one advertised by Ham Radio Supplies, of 323 Elizabeth St., Melbourne, 3000. It is ready calibrated in (arbitary) S units.

On receive, the relative signal strength is indicated by comparing the a.g.c. rail voltage with that of the regulated supply rail. As the signal strength increases, the a.g.c. rail voltage falls and the voltage across the meter rises. The meter is thus forward reading. The no-signal voltage across the meter is set to zero by means of the 2K tab pot, while the 22K in series with D20 is used to set the full scale deflection of the meter.

On transmit, voltage is applied to the base of the 2N3564, switching it hard on and effectively grounding the a.g.c. line. Rectified r.f. from the p.a., negative going in polarity, is compared with the voltage on the regulated supply rail to give a forward reading indication of power output. The 22K tab pot in series with D21 is used to set the full scale reading of the meter. The two diodes D20 and D21 are needed to prevent interaction between the two negative supplies to the meter.

SIGNAL INTERCONNECTIONS

Fig. 15 shows the signal interconnections between the various modules of the receiver and some of those for the transmitter. The references on the various modules are the figure numbers given in "A.R." since the series started in November 1968. It is recommended that this description be read in conjunction with the back articles.

Note that all signal wiring between the boards is done with small diameter co-axial cable for r.f. and with shielded cable for audio.

The signal from the antenna goes via the antenna change-over relay (RL2) through one section of the bandswitch to the link coils on each receiver front-end board. The 9 Mc. outputs from each board are all paralleled and taken to the filter pre-amplifier. Note that the filter pre-amplifier also accepts signal from transmitter balanced modulator and that the signal change-over is done on the filter pre-amp. board by means of a diode (D6).

On both receive and transmit, the output of the filter pre-amp. is taken to the filter board from which it goes either to the receiver i.f. strip or the 9 Mc. transmit amplifier. Selection of the signal path is effected by means of diode D9 on the 9 Mc. amplifier board.

There are three outputs from the i.f. strip—a.m. (not limited), a.m. (limited) and a 9 Mc. s.s.b./c.w. outlet to the product detector. The first two (audio) outlets go to two of the three switch positions, with the third position accepting audio from the product detector.

The product detector, b.f.o. and balanced modulator are housed together in a die cast box, the output of the b.f.o. being connected inside the box to the product detector/balanced modulator board. Fig. 14 shows how h.t. is applied either to the p.d. or b.m. to select the required function.

Audio from the mode selection switch is amplified in the spare section of the uA719C 9 Mc. amplifier on the

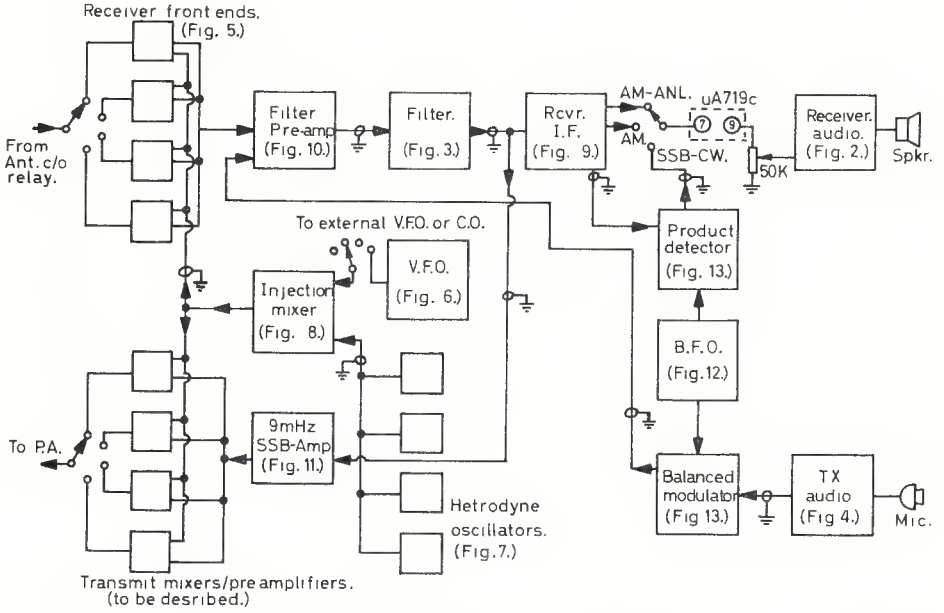

FIG. 15. 4 BAND TRANSISTOR TRANSCEIVER - Signal interconnections.

i.f. board before passing to the receiver audio module via the audio level control. This will be explained more fully below.

Returning to the front-end of the receiver, the outputs from the four (or more) heterodyne crystal oscillators are applied in parallel to the injection mixer. The appropriate crystal oscillator is selected by switching h.t. to it (see Fig. 14). The v.f.o. output or one of the external frequency control sources is applied to the injection mixer, the output of the mixer being applied at all times to the paralleled inputs of the four rx front-end boards and the four transmitter mixer/pre-amp. boards. Once again selection of the required function is made by applying h.t. to the appropriate p.c.b. via the bandswitch.

Output from the 9 Mc. s.s.b. amplifier is applied to the four paralleled inputs of the transmit mixer/pre-amp. boards.

Band switching in the receiver has thus been reduced to a single bank with most of the frequency selection being done via the h.t. line.

The treatment of the audio outputs from the i.f. strip and product detector may need expansion.

A spare "transistor" is available on the uA719C in the i.f. strip and this is used to provide additional a.f. amplification before the main audio module.

The required audio output (a.m. unlimited, a.m. limited, or s.s.b./c.w.) is taken from the wiper arm of the function switch straight to pin 7 on the uA719C. Output is taken from pin 9 of the i.c. In the project p.c.b's these spare pins are made readily available on the top of the p.c.b. by use of terminal pins.

Output from pin 9 is taken direct to the top of the 50K audio level control, the slider of which goes direct to the input points on the audio module.

After the rest of the tx modules have been described, the balance of the signal interconnections as they apply to the remainder of the transceiver will be detailed.

AVAILABILITY

The voltage regulator boards and kits will be made available in the usual way by application to one of the authors the price being $16.60 plus 20c postage for the full kit. Boards will be separately available at $2.00 each plus 5c postage.

ERRATUM

It is regretted that an error appeared in the January issue. Fig. 9 shows that the input to the uA719C is with the coil tap going to pin 2 and the decoupled side of the input going to pin 1.

These connections should be reversed with the "hot" input from the coil going to pin 1 and the "cold" or decoupled side to pin 2.

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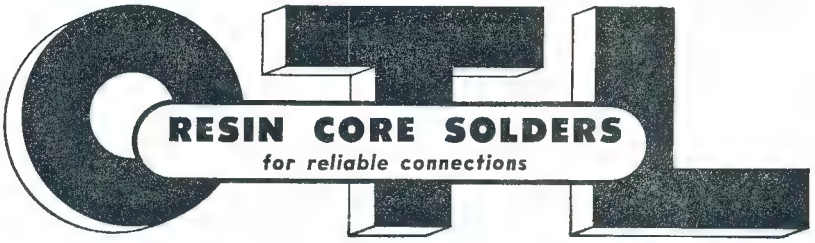

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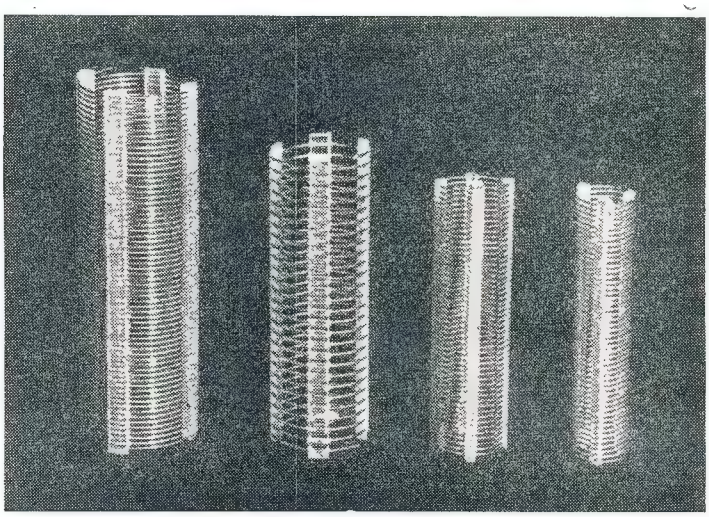

No.	Diam.	Turns per Inch	Length	B. & W. Equiv.	Price
1-08	1/2"	8	3"	No. 3002	66c
1-16	1/2"	16	3"	No. 3003	66c
2-08	5/8"	8	3"	No. 3006	76c
2-16	5/8"	16	3"	No. 3007	76c
3-08	3/4"	8	3"	No. 3010	91c
3-16	3/4"	16	3"	No. 3011	91c
4-08	1"	8	3"	No. 3014	$1.04
4-16	1"	16	3"	No. 3015	$1.04
5-08	1 1/4"	8	4"	No. 3018	$1.28
5-16	1 1/4"	16	4"	No. 3019	$1.28
8-10	2"	10	4"	No. 3907	$1.68

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References: A.R.R.L. Handbook, 1961; "QST," March 1959; "Amateur Radio," December 1959.

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The W5OMX Communications Receiver*

Single-Conversion Superhet with Good Stability

COL. DAVE CURTIS,† W5OMX

LONG-TIME "QST" readers will recall W1DX's excellent article on receiver design in the January, 1957 issue.[1] At the time it appeared, the article was studied with great interest. Particularly, the point that selectivity belongs as close to the antenna as possible seemed to make a great deal of sense. With the appearance of high frequency filters at reasonable prices, the author initiated the design of a receiver to utilise this principle. For various reasons, however, this receiver never got beyond the block-diagram stage. A more recent article by W1DX,[2] which was illustrated with an operational piece of hardware, provided the final push. Serious design and construction followed, and the "W5OMX" receiver, described here, is the result. It is a spectacular performer.

● As communications receivers go, this one is reasonably simple and straightforward. It combines some of the best features of previous designs, including a high frequency crystal filter for s.s.b. selectivity, an audio filter for c.w. selectivity, a beam-deflection mixer, dual detectors, audio-derived a.g.c., and a temperature compensated v.f.o.

★

The W5OMX Receiver. Main tuning dial (J. W. Miller, MD-7) has both 6:1 and 36:1 tuning ratios. A 6:1 planetary drive assembly (Arrow Electronics, Type 4511) is used on the preselector tuning capacitor. The pointer is home-made.

★

Unfortunately, the author's shack is not equipped with test gear adequate to permit performance measurement. Consequently, resort had to be made to subjective comparison, and the opinions of fellow Amateurs. These judgments suggest that the double-conversion receiver, utilising a low frequency second i.f. to obtain selectivity, may be on the way out. The author's second receiver —a 16-tube double-conversion job of sound design—simply cannot compete. In side-by-side tests, using a common antenna the contrast is remarkable. The new receiver performance is characterised by a clarity in signal quality, the result of a markedly lower overall noise level. Signals masked to unintelligibility by noise in the older receiver become readable copy. In conditions of reasonably low atmospheric noise, signals appear to pop out of surrounding quiet.

PERFORMANCE

In more useful specifics, here is how the receiver stacks up:

Sensitivity: Very f.b. Digs right down to the noise level on all bands, 80 through 10 metres. The receiver has made possible R5 copy of both ends of a W6/W2 QSO on 40, and of a KL/W4 QSO on 20, using only a finger touching the input connector as an antenna!

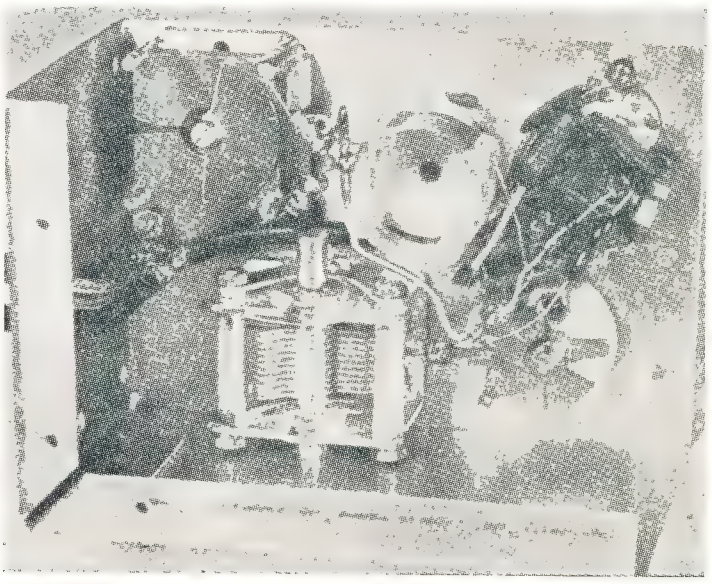
Stability: Truly marvellous. From a cold (room temperature) start, drift is inconsequential after a 15-minute warm-up. Further, the switching arrangement permits leaving the filaments on continuously. When this is done, and heat soaking has occurred, there is no apparent drift after the mode switch is turned to the appropriate "on" position. If there is any drift, it is the other guy!

Selectivity: About right for s.s.b. Gives good single signal selectivity on c.w.

Mechanical: Can take sharp raps with no noticeable frequency shift.

Birdies: A few. There are one or two of consequence on each band segment, except on 15 metres where there are six (by actual count). These tune sharply, and seldom bother reception. Nevertheless, this is a basic design deficiency which, perhaps, could be overcome by someone who is mathematically inclined and who can select conversion frequencies more intelligently.

A.g.c.: The circuit suggested by W1DX[2] is the best we have seen. S.s.b. signals ranging from S2 or 3 to 10 over 9 come out of the speaker at quite reasonably similar levels. This is one a.g.c. that will be used most of the time.



V.f.o. assembly with the side-top cover removed. The 6AU6 socket and associated components are at upper right with the band-set capacitor C7 at lower right. The coil is glued securely to a ceramic stand-off insulator. The differential capacitor, C8, with temperature compensating capacitors C9 and C10 attached, is at upper left. Note that all major components and tie points are fastened securely to the same side of the enclosure for maximum mechanical integrity. When mounted on the chassis the right-hand end of the box in this view is at the top, the left-hand end is bolted to the chassis.

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* Reprinted from "QST," January, 1968.

† 29 Outer Octagon, Randolph AFB, Texas 78148, U.S.A.

1 Goodman, "What's Wrong with Our Present Receivers?" "QST," January, 1967.

2 Goodman, "Some Thoughts on Home Receiver Design," "QST," May, 1965.

CIRCUIT OUTLINE

Interested? Let's have a look at the schematic of Fig. 1. As far as the signal is concerned, this is a single-conversion receiver. The incoming signal is amplified in the single r.f. stage using the pentode section of a 6AZ8. It is then converted to an i.f. of 9 Mc. in a 7360 mixer. A band 2.8 Kc. wide is sliced out by a steep-skirted crystal filter, FL1. The signal is then amplified through three i.f. stages using 6BA6s, and finally detected by an infinite impedance detector, V3B, if a.m., or by a 6BY6 product detector, if s.s.b. or c.w. The otherwise conventional audio system includes a selective filter for c.w. work. The a.g.c. system is audio derived.

The main tuning element is the v.f.o., covering 5 to 5.5 Mc. Bands are changed by altering the frequency of local injection to the signal mixer. This is accomplished by heterodyning signals from the v.f.o. and from the crystal oscillator V2A to produce the required injection frequency in the output of the heterodyne mixer, V2B. A 3.5 Mc. crystal oscillator, using the triode section of the 6AZ8, provides markers for the low frequency edges of the bands covered.

THE V.F.O.

The v.f.o. is a 6AU6 in a very high-C Colpitts configuration. A differential capacitor, C8, in combination with NP0 and N750 fixed capacitors, permits simple and accurate adjustment of temperature compensation. With reasonable attention to mechanical design, and careful adjustment, stability is impressive indeed. This circuit was used in an earlier project,[3] and was found to provide stability comparable to that of the BC-221 frequency meter. No small part of the stability is due to the use of the rugged low-torque Miller tuning capacitor.

R.F. STAGE AND CRYSTAL CALIBRATOR

Air wound coils are used in the preselector. The gain in this stage appears to be approximately 12 to 15 db. on 80 and 40, dropping off to about 6 to 8 db. on 15 and 10. It does a good job of rejecting i.f. images (none have been found). With some antennae, the gain of this stage may have to be reduced slightly to prevent oscillation on the 80 metre band; on other bands the amplifier is perfectly stable at full gain. Input and output circuits are gang-tuned. Ceramic trimmer C1 (one for each input coil) is used to adjust the tracking.

The triode section of the 6AZ8A, V1B, is used in the crystal calibrator. The frequency can be "zeroed in" against a calibrating source by means of C4. Notice that the 15 metre band and all ranges of the 10 metre band are covered with a single set of preselector coils.

3 Curtis, "The W4JWV Single-Sideband Exciter," "QST," January, 1963.

SIGNAL MIXER

The 7360 performs the mixing function effectively, and contributes inconsequential noise. It does not appear to overload on even the very strongest signals. The mixer gain control, R2, is used to prevent oscillation on 80 metres, and to adjust the overall gain on the other bands. By adjusting the gain at this point, the high gain i.f. strip may be operated at full amplification at all times for optimum a.g.c. action.

I.F. AMPLIFIER

Since selectivity is provided ahead of the i.f. strip, these stages are designed purely for amplification. The 24 pF. capacitors across the hot ends of the i.f. transformers increase the overall gain spectacularly. A 0.2 volt signal at 9 Mc. injected into this strip ahead of the crystal filter comes out at a whopping 20 to 25 volts. This accounts in a large measure for the rather impressive overall sensitivity of the receiver. The i.f. gain control, R3, is used only during initial adjustment and testing; therefore it is not mounted on the panel, but on the rear apron of the chassis.

DETECTORS

The 6BY6 product detector, developed by W6TC for his very efficient HBR

C1—2-12 pF. ceramic trimmer (one for each L2 coil).
C2—Dual section air variable, approx. 50 pF. per section.
C3—See coil table.
C4, C12, C13—Approx. 12 pF. compression trimmer.
C5—See coil table.
C6—100 pF. variable.
C7—30 pF. air trimmer.
C8—27 pF. differential capacitor.
C9—22 pF., NP0.
C10—22 pF., N750.
C11—See coil table.
CR1-CR4, incl.—Silicon diode, 400 p.i.v., 1 ampere.
CR5, CR6—Silicon diode, 200 p.i.v., 750 mA.
FL1—9 Mc. crystal filter (McCoy "Silver Sentinel").
J1—Chassis mounting co-axial receptacle.
J2—Open circuit jack.
J3—Closed circuit jack.
L1-L7, incl.—See coil table.
L8, L9—Filter choke.
L10—0.5 hy. toroid.
M1—S meter.
R1, R2, R3, R5, R6, R7—Linear control.
R4—Audio taper control, S3 attached.
RFC1—24 turns No. 26 wound on 470,000 ohm ½w. resistor.
RFC2—Same as RFC1, 14 turns.
RFC3, RFC4, RFC5, RFC8—2.5 mh. r.f. choke.
RFC6, RFC7—1 mh. r.f. choke.
S1—7-section 7-pole 8-position ceramic rotary switch.
S2—S.p.s.t. toggle switch.
S3—S.p.s.t. switch (see R4 above).
S4—3-section 6-pole 5-position phenolic rotary switch.
S5—D.p.d.t. toggle switch.
T1—9 Mc. input transformer.
T2—9 Mc. output transformer.
T3, T4, T5—10.7 Mc. interstage transformer. Mount with spade bolts.
T6—Power transformer, 550 volts r.m.s., centre tapped, 110 mA.; 6.3v. 5 amp.
T7 2 watt audio output transformer (5000 ohms to voice coil).
T8—Transistor audio input transformer, 5000 ohms to 7500 ohms, centre tapped.

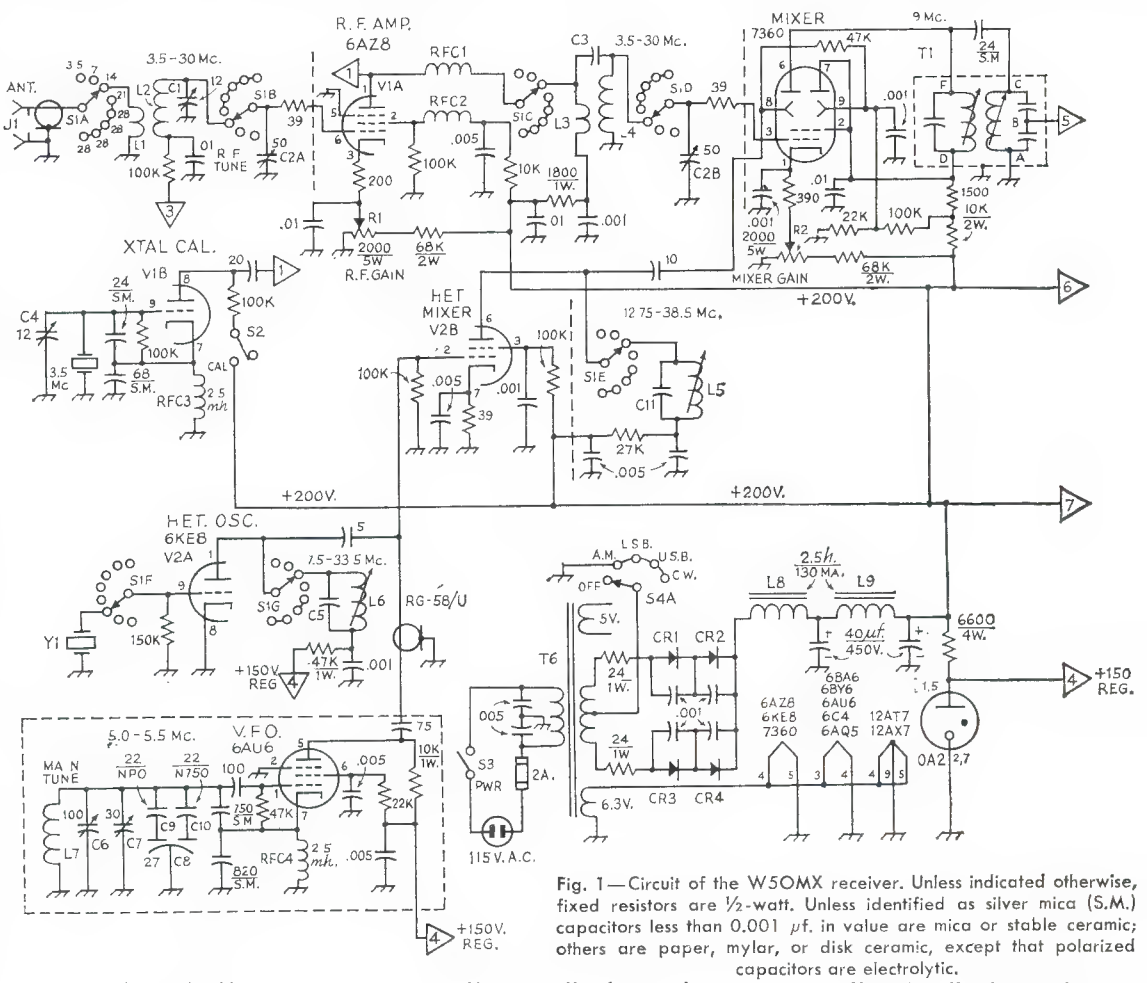


Fig. 1—Circuit of the W5OMX receiver. Unless indicated otherwise, fixed resistors are ½-watt. Unless identified as silver mica (S.M.) capacitors less than 0.001 μf. in value are mica or stable ceramic; others are paper, mylar, or disk ceramic, except that polarized capacitors are electrolytic.

Y1—See coil table. Y2—9001.5 Kc. (see text). Y3—8998.5 Kc. (see text).

receivers,[4] works well at 9 Mc. This circuit has the very desirable feature of accepting a wide range of signal levels with little or no apparent distortion in the audio product. The infinite impedance detector provides these same advantages in a.m. reception, without overloading the last i.f. transformer as would a diode.

B.F.O.

The b.f.o. uses the two triode sections of a 12AT7 as separate crystal oscillators. The crystals at 9001.5 and 8998.5 kc. (supplied by McCoy with the filter), permit selection of lower and upper sidebands, respectively, by keying the appropriate 12AT7 cathode. These crystals are adjusted to proper frequency by trimmers C12 and C13.

AUDIO SECTION

Three stages of audio provide generous output to high impedance phones or a speaker. You can hear signals on this receiver over the QRN of all but the noisiest "harmonics"! In the c.w. mode, a high-Q audio filter, composed of toroid L10 and its related capacitor, permits peaking the beat note at approximately 1,000 cycles. Substitution of a different value of capacitance will move the resonant frequency to your choice of pitch. Selectivity may be varied by adjustment of R7.

4 "Hints and Kinks," "QST," June, 1962.

A.G.C.

The a.g.c. circuit amplifies and full-wave rectifies audio from either detector, and controls the r.f. amplifier and all three i.f. stages. It is remarkably effective, and makes the multiparty s.s.b. ragchew a real pleasure. (Those who enjoy fiddling with knobs probably won't like it!) The fast-attack/slow-decay characteristics which result from the component values suggested by W1DX have proven to be very close to the ideal.

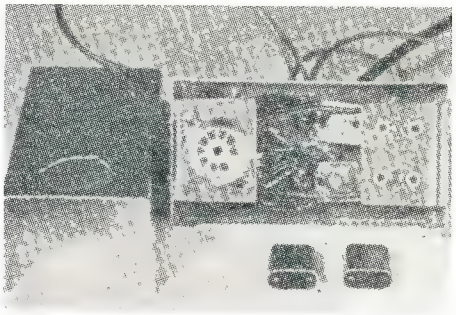
The S meter and power supply circuits should be familiar to most readers. S meter adjustments are made at the rear of the chassis. Silicon rectifiers are used in the power supply, and a voltage regulated tap supplies the v.f.o. and heterodyne oscillator.

MUTING

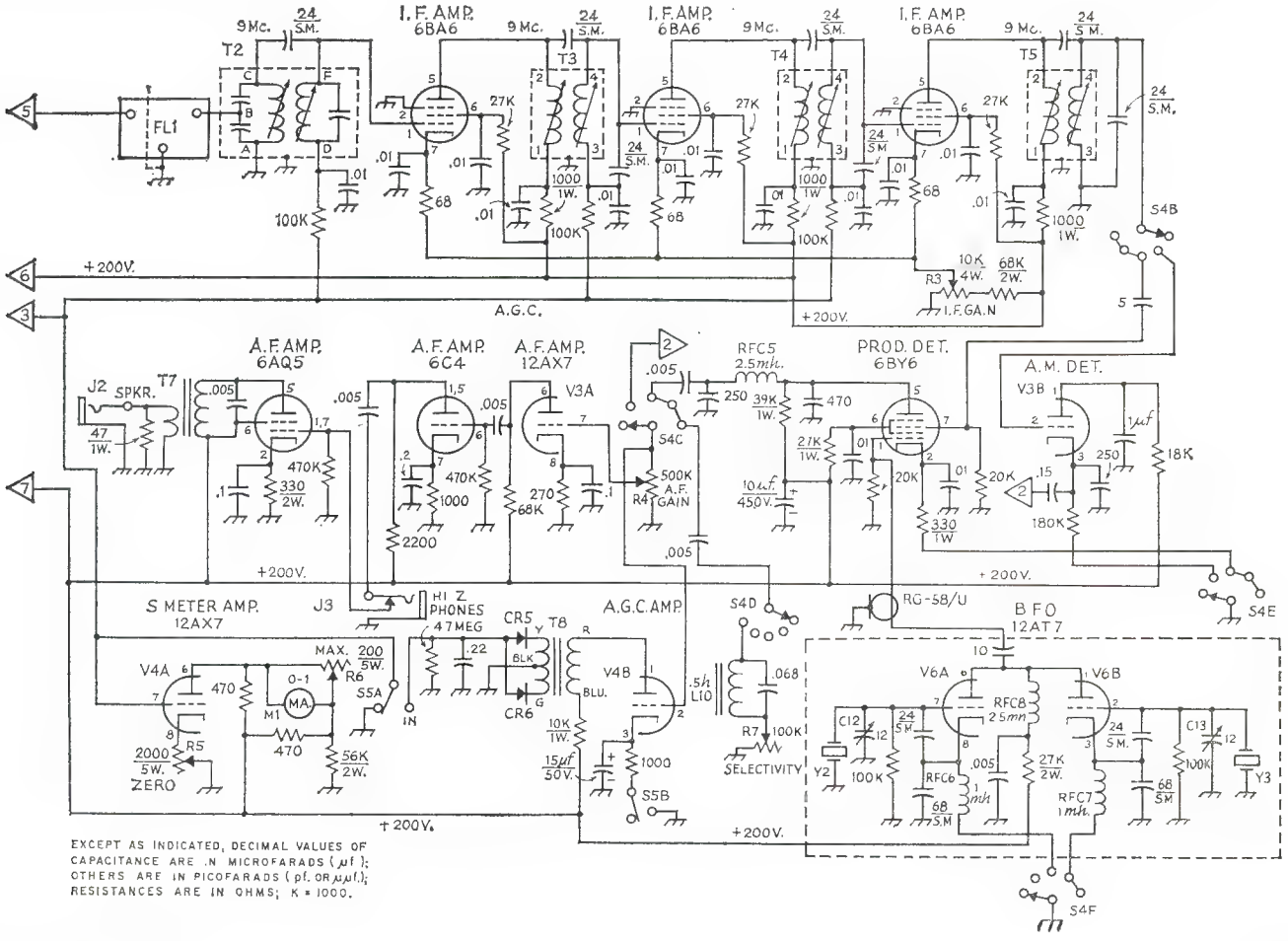
You will note that no provision for muting is indicated in the circuit schematic. Three possible arrangements are suggested. Your choice should be based upon how you intend to connect the receiver into the overall station set-up. If you intend to monitor your transmissions on the receiver, and use an antenna relay that grounds the receiver input on transmit, break the plus B or cathode connection of V1A, and insert the muting switch and remote connections at this point. If you have side-tone monitoring, you can cut off the receiver entirely by breaking the plus B or cathode connection of the 7360 mixer, and inserting the muting connections at that point. Finally, and perhaps the best of all, although additional components will be requried, use the muting arrangement suggested by W1DX.[2]

CONSTRUCTION

Viewed in its entirety, the construction of a receiver of this complexity may appear to be an overwhelming task. Certainly, it would be a very ambitious first project. However, for anyone with sufficient experience and skill to do the minor fabrication and locate



B.f.o. assembly with tube, cover and crystals removed. The sockets for the crystals and the 12AT7 are mounted on small aluminium brackets, the small components underneath being wired prior to final assembly. The crystals are plugged in internally and require no clearance holes in the cover. Crystal trimmers C12 and C13 are fastened to the bottom of the Minibox enclosure, at the centre. The shielded leads and output co-ax. cable leave the enclosure through tightly fitting holes to minimise r.f. leakage.



sensibly the many small components, it should be a feasible undertaking. The primary ingredients of successful home-brew construction seem to be patience, a willingness to take one step at a time, and the interest to keep going. If you have these talents, you can probably build a receiver of the same superlative performance as the one described. And it should be better looking; this one is the final result of many, many component substitutions in the search for optimum performance.[5]

The following paragraphs contain construction and alignment suggestions, roughly in the order followed by the author. Additional information may be obtained by a careful study of the several illustrations and accompanying explanatory captions.

The receiver is built on a 10" x 14" x 3" aluminium chassis which fits into the 11" x 15" x 9" cabinet. An additional 10" x 17" x 3" chassis (the smallest size obtainable made from 16 gauge stock) was purchased as a source of material for the v.f.o. enclosure and shielding partitions.

ASSEMBLING THE V.F.O. AND B.F.O.

Make the v.f.o. first. The main part of the enclosure was made from a corner of the spare chassis. Its dimensions are $4\frac{5}{8}$" x $3\frac{1}{4}$" x 3". The side/top cover was cut from adjacent spare chassis material. (The rear of the box is left open.) Mount the major components all on one side of the box, as shown in the detail photograph, to minimise frequency changes with mechanical stress. Care should be used in locating the tuning capacitor so that its extended shaft will be high enough above the chassis to clear the McCoy filter in the i.f. strip (see top chassis photograph), and yet not be so high that it will crowd the dial too close to the upper edge of the panel.

The b.f.o. components are assembled in a $1\frac{5}{8}$" x $2\frac{1}{8}$" x 4" Minibox. Construction is detailed in one of the photographs.

BAND SWITCH

Before starting to lay out the component pattern on the chassis, the under chassis shields should be cut, using material from the aprons of the spare chassis. The longer shield has a length of $8\frac{3}{4}$"; the other two are 7" long. Then they should be placed temporarily in the chassis while their positions are adjusted. Space them apart suitably to provide adequate room for the coils, and measure the spacing accurately.

Make a mark on the rearmost shield, indicating the distance that the switch shaft will be placed from the end of the chassis. Mark and drill the switch-shaft and mounting holes in the three partitions, using extreme care to see that they are as identically located as possible. Make the holes reasonably oversized. Then assemble the switch and shields as a unit, using spacers on the switch assembly rods to obtain the partition spacings measured earlier. Do not tighten the assembly nuts more than finger tight. Place the assembly in the chassis, and press down firmly on the shields while the assembly nuts are tightened. Spot the shield mounting holes, remove the assembly, and drill the holes.

Avoid any mounting holes in the area that will be occupied by the v.f.o. box, since this box must rest flat on the chassis. (The b.f.o. assembly can be raised on spacers to clear any mounting screws in its area.) Additional holes that should be drilled in the shields are one in each of the shields, below and to the left (in the bottom view) of the switch wafers (for wires), one in the upper left-hand corner of the second shield, and another in the same relative position in the first shield (for tie-point strips). A $\frac{3}{8}$" hole should be drilled in the first shield, to the left of the short vertical shield. This will be used to pass the co-ax. feed line from the v.f.o. to the heterodyne mixer, and some of the power leads. The corners of the partitions that rest in the fold of the chassis should be cut off to allow passage of wiring between the panel and the rear of the chassis.

CHASSIS LAYOUT

Once the shield locations have been determined, the positions of the two main rows of components will become apparent. With the v.f.o. subassembly placed with its rear edge flush with the rear edge of the chassis, and the shaft of the tuning capacitor central on the chassis, the location of surrounding components can be spotted. In locating the preselector tuning capacitor, place it far enough toward the edge of the chassis to assure space for its dial on the panel.

After all hole centres have been marked and hit with a centre punch, the various holes may be drilled or cut. The author used a nibbler to cut the i.f. transformer holes to approximate size, and finished up with a file.

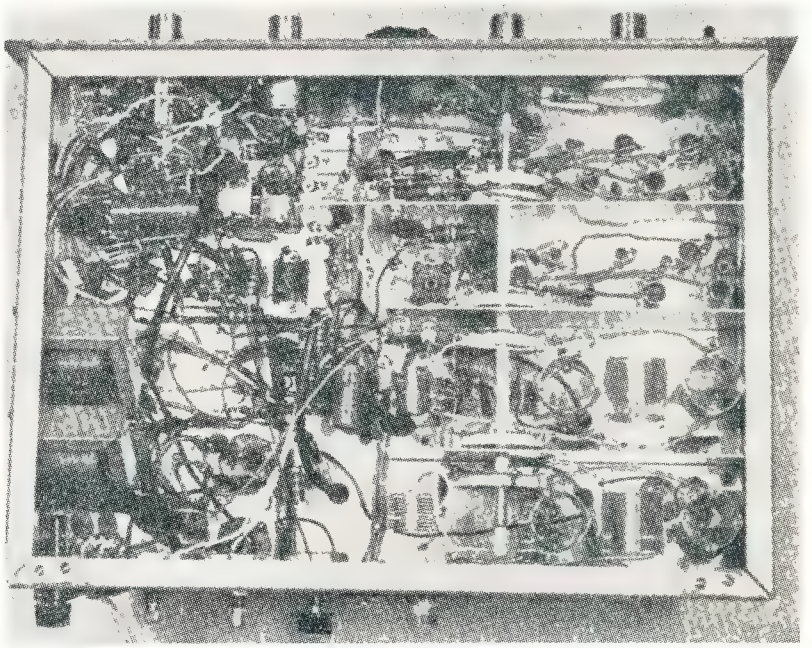
Before mounting any components on the chassis, fasten the panel temporarily in place, and place the shafts of the v.f.o. and preselector tuning capacitors against the back of the panel while you mark the shaft heights.

WIRING

Tie-point strips should be located liberally on the underside of the chassis, convenient to tube sockets and related components. It is advisable also to place grounding solder lugs on most of the mounting screws. You may not use all of them, but it is much more convenient to install them as you mount the components than later on when space becomes scarce as the wiring progresses.

Power supply and filament connections should be made first. Thereafter, the wiring procedure is not particularly critical. Installation of the preselector coils can be left as a last operation, after the v.f.o. and b.f.o. circuits have been adjusted. To make sure that no connection is overlooked, it is a good idea to mark the schematic with a coloured pencil as each connection is completed.

The author wired the front circuits first, working toward the rear of the chassis. Following standard practice, long leads, particularly those connecting front-panel controls and switches to components at the rear of the chassis, may be made with shielded wire. This practice permits fastening the leads



Bottom view showing band switch and coil compartments. The pair of close-spaced wafers at the top switch the heterodyne-oscillator coils and crystals. The single wafer below switches the heterodyne-mixer coils. The signal-mixer coils are in the next compartment, switched by the pair of widely-spaced wafers. R.f. stage coils are in the bottom compartment; one of the two switching wafers is hidden by the lip of the chassis. The 40 and 80 metre air-wound coils are cemented to platforms made of polystyrene sheet. The higher frequency coils are supported on switch terminals. The mode switch is in the upper left-hand corner, filter chokes in the lower left-hand corner. A.g.c. components are mounted on tie points on the short vertical shield near the centre.

5 To assist those who wish to duplicate this project, the author will provide full-size templates for chassis and front panel, an enlarged schematic, complete with parts list, and 8 x 10 inch enlargements of the four primary illustrations, at a cost of $4.50 post paid.

COIL TABLE

L2, L4					L1	L1/L2	L3	L3/L4	C3
Band	Turns	Wire Size	Diam. Inch	T.P.I.	Turns	Space	Turns	Space	pF.
80	50	24	1	32	6	2 t.	6	10 t.	None
40	22	24	1	32	6	2 t.	3	10 t.	None
20	12	20	1	16	4½	1 t.	3	6 t.	5
10–15	6	20	¾	16	3	1 t.	3	2 t.	5

L5					L6				
Band	Freq. Mc.	L μh. (Nom.)	Type	Y1 Mc.	Freq. Mc.	L μh. (Nom.)	Type	C5 pF.	C11 pF.
80	12.75	3.3	21A336	7.5	7.5	6.8	21A686	45	25
40	16.25	2.2	21A226	11.0	11.0	3.3	21A336	30	20
20	23.25	1.5	21A156	18.0	18.0	2.2	21A226	20	10
15	30.25	1	20A106	25.0	25.0	1.5	21A156	None	None
10	37.5	0.82	20A827	32.00 33.50	32.25	1	20A106	None	None
	38.5	0.82	20A827	33.0 33.5	33.25	1	20A106	None	None

L7 — 8 turns No. 20, 1 inch diam., 16 t.p.i.

L1/L2 and L3/L4 (as well as L7) are of Miniductor, Air Dux, or Polycoil stock, with the indicated number of turns removed to provide spacing between the main coils and the coupling links.

L5 and L6 are iron-slug coils (phenolic). Type numbers are J. W. Miller (suffix RBI). Those with prefix 20 are ¼ inch diam.; prefix 21 indicates ⅜ inch diam.

solidly in place by soldering the shield to conveniently located soldering lugs along the way. Shielded wire should also be used for all a.f. grid leads to avoid unpleasant feedback problems. R.f. by-pass capacitor leads should be as short as possible, using the centre post of the related tube socket as a common grounding point.

TESTING THE V.F.O. AND B.F.O.

The v.f.o. tuning range should be checked first with all tubes except the v.f.o. voltage regulator tube out of their sockets. After power has been turned on and the v.f.o. allowed to warm up, a v.t.v.m. with an r.f. probe should show about 2 volts at the output coupling capacitor.

The v.f.o. frequency can be checked by comparing it with the signal from a calibrated source, such as a BC-221 frequency meter, or a general coverage receiver. Set C8 at about midpoint. Set the tuning capacitor C6 at about 3 degrees from maximum capacitance. Then adjust C7 to bring the frequency to 5.0 Mc. Turn C6 to about 3 degrees from minimum capacitance, and check the frequency again. If the frequency is higher than 5.5 Mc., spread the end turns of the coil apart, and repeat the process. If the frequency is too low, squeeze a few of the turns slightly closer together, and repeat the process. It should be possible to arrive at an adjustment where the 5 to 5.5 Mc. band occupies about 95 per cent. of the dial, with the band central on the dial.

Plug in the b.f.o. tube and check the r.f. output voltage. It should be about the same as from the v.f.o., i.e. 2 volts.

CHECKING THE AUDIO SECTION

Plug in the audio tubes. With speaker or headphones connected, and the a.f. gain control near maximum, a sharp click, when the top end of the gain control is touched with the lead of a pencil, will tell you that the audio stages are working.

I.F. ALIGNMENT

Plug in the 7360 mixer and i.f. tubes. Connect the r.f. probe at the arm of S4B. Introduce a 9 Mc. signal at the input to the last i.f. stage. The author used the crystal calibrator as the source, with a 9 Mc. crystal, borrowed from his s.s.b. exciter, plugged into the calibrator. The 20 pF. calibrator coupling capacitor was temporarily disconnected from pin 1 of the 6AZ8, and connected by means of an extension lead to pin 1 of the last 6BA6 i.f. tube. (A reasonably accurately calibrated r.f. signal generator may be used, if available.) Tune T5 for maximum output. Move the signal source to pin 1 of the second i.f. tube, and adjust T4. Do the same with the first i.f. tube and T3. You will probably have to reduce the i.f. gain as you move down the i.f. strip to avoid burning out the diode in the probe.

Introduce the signal at the output connection of the crystal filter, and adjust T2. Finally, inject the signal at pin 3 of the 7360 mixer, and adjust T1. (If you are using an r.f. signal generator, you may have to jockey the frequency slightly to hit the centre of the crystal filter passband.) Reconnect the calibrator coupling capacitor to the plate of the 6AZ8.

S METER ADJUSTMENT

The next step is to adjust the S meter circuit, since it will be used in adjusting the preselector. With V4 out of its socket, adjust R6 for full-scale S meter reading. Plug in V4. Allow the tube to warm up and, with the a.g.c. switch off, adjust R5 for a zero reading.

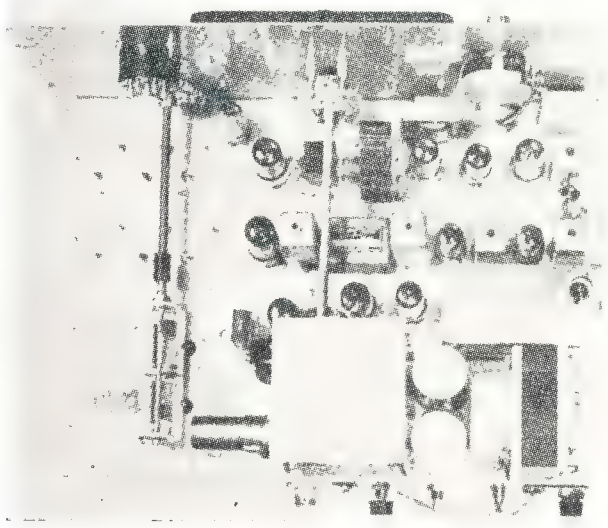
HETERODYNE TUNING

Now plug in the 6KE8, and adjust each slug-tuned coil (L6) for approximately 3 to 4 volts as measured with the r.f. probe at the "hot" end of the coil. The lower frequency crystals are capable of producing much more than 4 volts; the higher frequency crystals may not provide quite 4 volts. Tune for all you can get up to a maximum of 4 volts.

Using a grid dip oscillator, tune the heterodyne mixer coils (L5) to the frequencies listed in the coil table. Be sure that the band switch is set to the band corresponding to the coil you are checking, because the stray capacitance may vary with the switch position.

PRESELECTOR ALIGNMENT

Alignment of the preselector coils can now be undertaken. The author



Top chassis view of the W5OMX receiver. Mounted in two groups in the upper left-hand corner of the chassis are the slug-tuned coils L6 (top) and L5 (below). In the lower left-hand corner are the preselector tuning capacitor and the C1 tracking trimmers. The i.f. strip runs across the centre with components in logical order, starting with the 7360 mixer, and turns vertically at T4, ending at T5. Proceeding to the left from T5 are the two detector tubes, the 6AQ5 audio output tube, the heterodyne crystals, the 6KE8 and the 6C4 (above). The audio output transformer and c.w. filter toroid are to either side of the mixer-gain (top) and c.w. selectivity controls. Occupying the lower right-hand corner of the chassis are the v.f.o. and b.f.o. units, and power supply components. Immediately above the v.f.o. compartment are the calibrator crystal (with hole for access to trimmer C4 just to the left), the 6AZ8, the 12AX7 a.g.c. tube (V4), and the VR tube. Along the rear apron are the antenna connector, speaker terminals, i.f. gain control, S meter controls, muting terminals, and fuse holder.

built the preselector coils for 80 metres first, and aligned the front end on this band before proceeding to the higher frequency bands, in order. However, it need not be done this way. The alignment procedure is the same for all bands. The important consideration in making the coils is to keep L2 and L4 as nearly identical as possible, including lead length and proximity to chassis and shields.

With a set of coils in place, introduce a signal near band centre at the antenna connector. Set the v.f.o. to mid scale, and the mode switch to one of the sideband positions. Adjust C2, and the slug of L5 for maximum S meter reading. Then tune the preselector slowly across the signal. If the signal peaks at two dial settings, it means that the circuits are not tracking. By cautious adjustment of C1, and the turn spacing of either L2 or L4, a condition should be found where only a single S meter peak occurs as C2 is tuned across the signal. (The paragraphs on r.f. alignment in the "Receiving Systems" chapter of the A.R.R.L. Handbook explain how this is done.)

TEMPERATURE COMPENSATION

To adjust the v.f.o. temperature compensation, the most stable frequency source you can get is required. The crystal calibrator will do nicely. Allow the receiver to warm up thoroughly; leave it on for at least an hour or two. Tune the receiver to zero beat with the calibrator. Then, as drift occurs, adjust C8 slightly, and bring the receiver back to zero beat with C7. Continue to do this until no drift is apparent.

B.F.O. ADJUSTMENT

Remove the cover of the b.f.o. enclosure, and adjust trimmers C12 and C13 for optimum s.s.b. reception. Most 80 and 40 metre stations use l.s.b., while those operating in the higher bands use u.s.b. (Most c.w. operators prefer the u.s.b. position.) The b.f.o. frequency is adjusted so that it falls only high enough on the filter slope to assure adequate low frequency response. With this adjustment, the "other side" of a c.w. signal simply is not there.

V.F.O. CALIBRATION

After checking to make sure that the 5 to 5.5 Mc. band is still centred on the dial, the dial may be calibrated (0 to 500, and 500 to 0) against a standard, such as a BC-221 frequency meter. The tuning should be found to be close to linear. A single dial calibration for all bands requires the exact crystal frequencies listed in the Table. Crystals not too far off on the high side can be "rubbered in" with a small compression trimmer in parallel with the crystal. Crystals on the low side must be ground or etched in. (The 3.5 Mc. band edge marker will provide a reference.) Otherwise, C7 in the v.f.o. will have to be retrimmed each time bands are changed, zeroing the v.f.o. against the calibrator with the v.f.o. dial set at the previously calibrated zero mark.

Before placing the receiver in the cabinet, punch four or five holes through the bottom, and along the top back of the cabinet for air circulation.

You should now be able to make R5 copy of signals that your Amateur friend down the block may not be able to hear. Congratulations!

☆

PROVISIONAL SUNSPOT NUMBERS

SEPTEMBER 1968

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	78	16	79
2	82	17	81
3	130	18	86
4	131	19	89
5	126	20	91
6	96	21	95
7	98	22	107
8	106	23	122
9	128	24	153
10	138	25	197
11	145	26	189
12	150	27	183
13	163	28	149
14	113	29	137
15	88	30	91

Mean equals 120.7.

Smoothed Mean for March 1968: 104.8.

Predictions of the Smoothed Monthly Sunspot Numbers

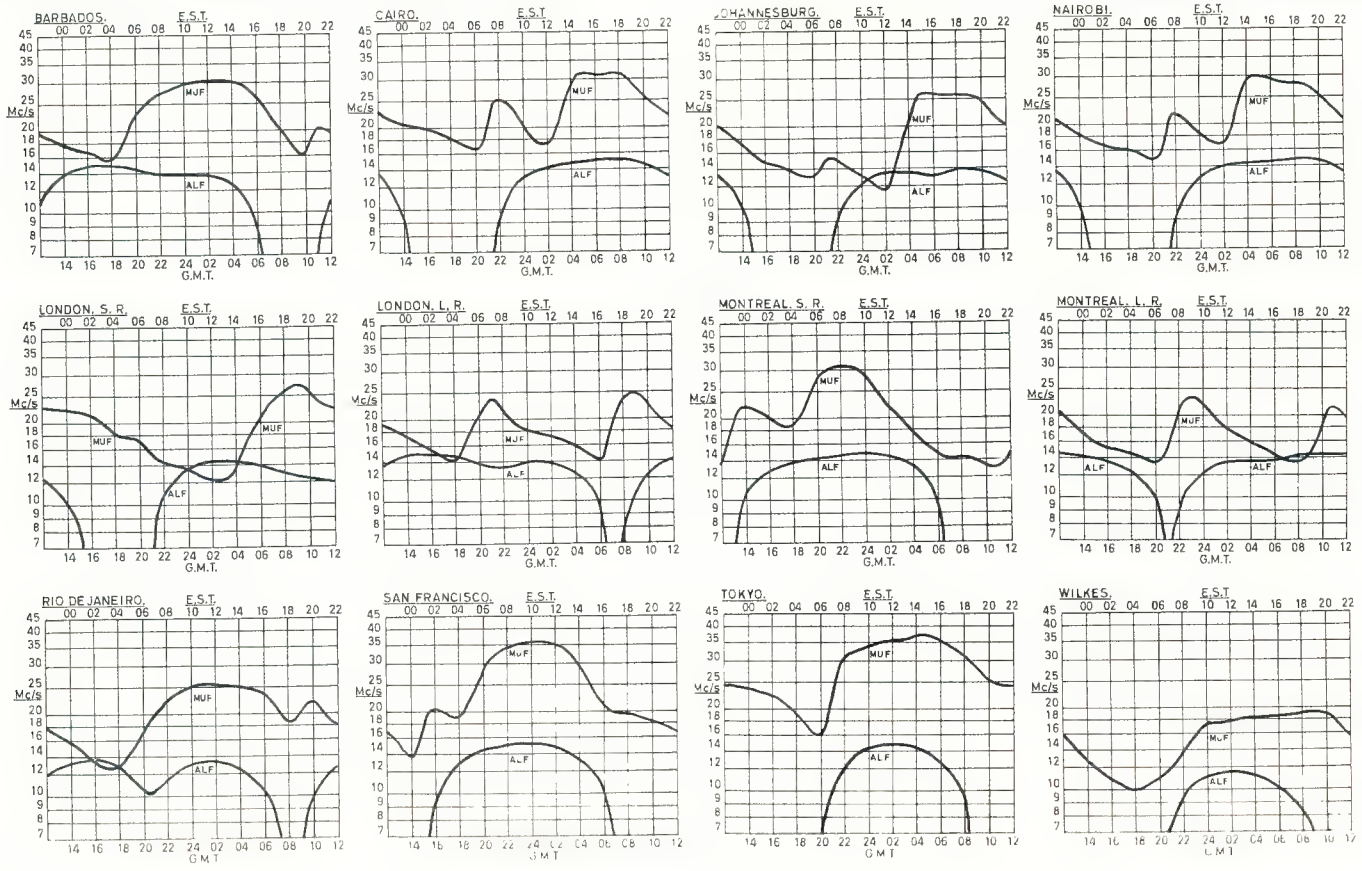
October	106	January	100
November	104	February	98
December	102	March	97

—Swiss Federal Observatory, Zurich.

AMATEUR FREQUENCIES:
USE THEM OR LOSE THEM!

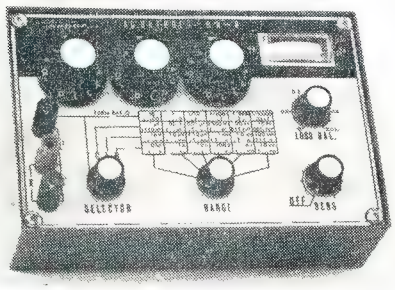
PREDICTION CHARTS FOR MARCH 1969

(Prediction Charts by courtesy of Ionospheric Prediction Service)



New Equipment

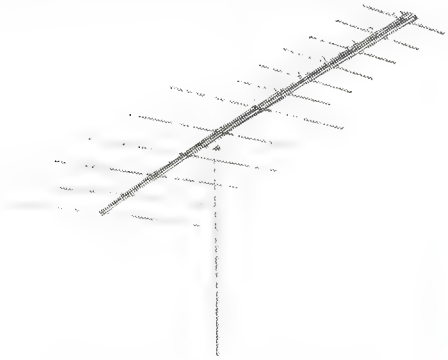
VERSATILE AC BRIDGE



Model BR8 AC Bridge branded "Rapar," measures resistance, capacitance, inductance and transformer turns ratios with high accuracy performance. The unit operates from 9-volt battery; dimensions: 7½" wide x 5" deep x 3" high. Housed in blue hammertone finish metal case; price: $46 plus 15% sales tax.

Further information from Radio Parts Pty. Ltd., 562 Spencer St., Melbourne, Vic., 3000, and City and East Malvern branches.

LOG PERIODIC FOR 6-2 METRES



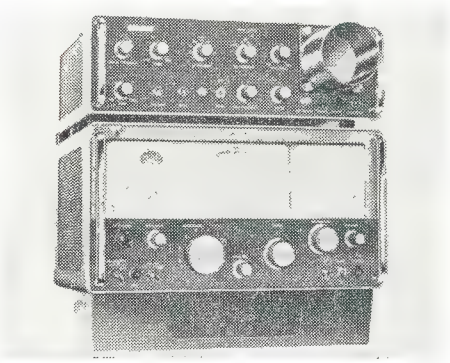
Shortly available from Bail Electronic Services is a log periodic antenna for 6 and 2 metres. Manufactured by Hy-Gain Electronics Corp., U.S.A., this model LP62 antenna is claimed to provide the ultimate in uni-directional, duo-band performance on 6 and 2 mx. All elements and boom are constructed of heavy seamless aluminium tubing. Designed to feed from 52 ohm co-ax.

Electrical Specifications: gain (6 mx), 8 db; gain (2 mx), 15 db.; front-to-back ratio, 25 db.; max. power input, 1 kw.; v.s.w.r., less than 2:1; impedance, 52 ohms; unidirectional pattern.

Mechanical Specifications: Longest element, 9 ft.; boom length, 24 ft.; turning radius, 16 ft.; net weight, 20 lbs.; max. wind survival, 100 m.p.h.; mast diameter, 1⅝" o.d.

Further details from Bail Electronic Services, 60 Shannon St., Box Hill North, Vic., 3129; or from N.S.W. rep., Sandy Brucesmith, 47 Hyman St., Tamworth, N.S.W., 2340.

PANORAMIC DISPLAY UNIT

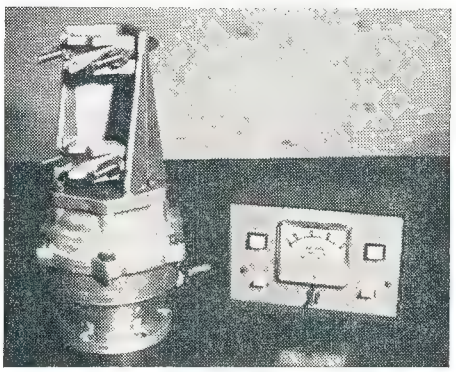


Designed as a companion unit to the Eddystone 830/2 communications receiver (also illustrated), the EP20 panoramic display unit now available is intended for applications where a visual display of h.f. or l.f. signals is advantageous. Characteristics such as modulation, amplitude, presence or absence of spurious emissions and interference, may be observed at a glance.

The EP20 is particularly useful when setting up a receiver for s.s.b. or f.s.k. signals. An additional facility is that the display unit can be used as a wobbulator for the visual alignment of the i.f. stages of receivers.

Specifications and other details obtainable from R. H. Cunningham Pty. Ltd., 608 Collins St., Melbourne, Vic., 3000.

MOTORISED ANTENNA ROTATOR



Heavy duty antenna rotator, "Emotator" model 1100M, available shortly from Japan, features heavy cast aluminium construction, stainless steel bolts, nuts and washers. Bearing design with 90- ball bearings provides high vertical carrying capacity enabling it to withstand bending pressures due to unbalanced weight, wind, etc. Limit switches prevent over-run. Positive braking with solenoid operated double plunger. Drive is through steel gears from a fractional horse power motor.

Specifications: Torque, 400 kg/cm.; vertical moment, up to 7,000 kg/cm.; time for one rev., 55 secs. (approx.); brake power, 5,000 kg/cm.; supports beam assembly weight of 200 kg.; max. vertical thrust, 1,000 kg.; mast diameter, 1¼" to 2¼"; weight, 17½ lb. (approx.); control cable, 7 wires; approx. sizes, 13¾" high, 5¼" base diam., 7¼" largest diam.

The Indicator-Control Box is attractively finished in grey lacquer with large illuminated meter, indicator lights and piano lever "left-right" controls coupled to micro-switches. Transformer is contained within the control box. Size: 5½" x 8⅜" x 4". Weight, 5 lb. 12 oz.

Further information from Bail Electronic Services, 60 Shannon St., Box Hill North, Vic., 3129.

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FEDERAL AWARDS

W.I.A. 52 Mc. W.A.S.

Additional members to 31/12/68:—

Cert. No.	Call	Additional Countries
83	VK4ZRG	2
84	VK3AQR	2

Intending applicants for this award are reminded that new rules are now in effect in relation to the number of VK call areas required. Full details will be found in "A.R." June 1968, p. 14.

AUSTRALIAN D.X.C.C. COUNTRIES LIST OMISSION

Despite numerous checks to ensure accuracy, UH8, Turkoman, was not included in the list as published in January 1969 "A.R."

It is suggested that D.X.C.C. members and others interested in the list should insert the addition in the space below UL7, Kazakh, at the foot of column three.

Any inconvenience caused to members by this omission is regretted.

FEDERAL AWARDS MANAGER—CHANGE OF ADDRESS TO WHICH APPLICATIONS FOR AWARDS ARE TO BE SENT

In future all applications for Awards, enquiries, etc., should be addressed to:—

Federal Awards Manager, W.I.A.,
P.O. Box 67,
East Melbourne,
Victoria, 3002,
Australia.

"ELECTRONICS AUSTRALIA" D.X.C.C. LISTING

Amateurs are advised that the D.X.C.C. Countries List, as published in "Electronics Australia," December 1968, Amateur Band News and Notes, pages 156 and 157, is NOT the current list for the D.X.C.C. Award. This list was taken from that published in "A.R." in January 1968 and since that time several important changes have taken place. The only official up-to-date list is that published in "A.R.," January 1969.

—Geoff Wilson, VK3AMK,
Federal Awards Manager.

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W.I.C.E.N. EXERCISE BY VK3 NORTH-WESTERN ZONE

A very successful civil defence exercise was held at Mildura on Sunday and Monday, 26th and 27th January, by the North Western Zone members. V.h.f. communication was provided for a 37½ mile Murray River Marathon Swim.

The problem of providing reliable v.h.f. communication can be appreciated when it is remembered that the actual river level is much lower than the surrounding country, added to this are cliffs and heavily timbered areas. Channel B 146 Mc. was used throughout, and all equipment being MR3A units.

A houseboat accompanying the eleven swimmers was fitted with a ground plane antenna, and from the start of the race at 1100 Saturday to 1730 Sunday, communication to the Mildura Base was through a portable station located on the cliffs at Mindook Station, approx. 17 air miles from Mildura. At 1730 Sunday a mobile station was brought into use to cover the houseboat, while the portable station shifted from Mindook to Monak. The Monak location was used from 2000 hours to 0230, at this stage the base had been working direct to the houseboat for some time. The marine/mobile operation ceased at 0600 Monday morning when the first swimmer arrived at Mildura, and from then to the arrival of the last swimmer at 2320 Monday, mobile stations were used to pass information from the swimmers' locations to the base. Over 100 formal messages were handled, dozens of which were phoned from the base to their destination.

NEW CALL SIGNS

SEPTEMBER 1968

[Although the following list was issued by the P.M.G. Dept. under the date of September 1968, all the VK3 call signs cover from June to September 1968.—Ed.]

VK1DI—D. I. Ralph, Flat 7, Clayton Court, Carroll St., Hughes, 2605.
VK1ZDR—R. C. Speer, Lawley House, Barton, 2600.
VK1ZJM—J. A. Mowatt, Station: Reid House, Allara St., Canberra, 2600; Postal: 4 Hinemoa St., Panania, 2213.

VK2AD/T—A. J. Brucesmith, 47 Hyman St., Tamworth, 2340.
VK2HI—A. H. B. Brodrick, 18 Rhoda Ave., Wagga Wagga, 2650.
VK2NM—L. Pollack, 2/241 Forest Rd., Arncliffe, 2205.
VK2QN—E. C. Roberts, 588 Punchbowl Rd., Lakemba, 2195.
VK2ADV—C. McHicks, 19 Harley Rd., North Avalon, 2107.
VK2BPB—P. Bass, 83 Nicholson St., Strathfield, 2135.
VK2ZFF—F. F. Teixeira, 17/70 Arthur St., Randwick, 2031.
VK2ZGP—G. K. Facey, 13 Coral Rd., Cronulla, 2230.
VK2ZHH—H. A. Tyrer, Lot 4, Kingdon Pde., Macquarie Fields, 2564.

VK3ER—Eastern & Mountain District Radio Club, 426 Riversdale Rd., Surrey Hills, 3127.
VK3HV—H. P. J. Trutmann, 7 Nerita Gardens, Corio, 3214.
VK3JD—J. G. Ditchburn, 80 Clausen St., North Fitzroy, 3068.
VK3NS—J. A. Taylor, 2 Valerie St., East Bentleigh, 3165.
VK3UI—D. S. Van Elkan, 520 Glenferrie Rd., Hawthorn, 3122.
VK3VH—D. A. Sinclair, 208 Canterbury Rd., Canterbury, 3106.
VK3VR—J. H. Dexter, 15 Glenshian Lane, Mt. Eliza, 3930.
VK3WP—B. A. Endersbee, 169 Canterbury Rd., Canterbury, 3126.
VK3YC—W. J. Douglass, 4 Brodie St., Bendigo, 3550.
VK3AFL—D. A. Page, 152 East Boundary Rd., East Bentleigh, 3165.
VK3AIA—S. C. McLean, 204 Balaclava Rd., Caulfield, 3162.
VK3AIC—J. A. Niedeck, 19 Talofa Ave., Ringwood East, 3135.
VK3AMW—Wangaratta and District Amateur Radio Club, 5 Gayer Ave., Wangaratta, 3677.
VK3AOR—R. W. McLean, 313 Crompton St., Ballarat, 3350.
VK3AQP—J. McL. Bennett, 56 Lancaster St., Ormond East, 3165.
VK3ATF—J. B. B. White, Grant St., Point Lonsdale, 3225.
VK3ATO—Wireless Institute of Aust., Midland Division, 504 McIvor Rd., Bendigo, 3550.
VK3AUT—A. U. Magnus, 10 Hillcrest Rd., Glen Iris, 3146.
VK3AVL—E. H. Connery, 75 South Cres., Northcote, 3070.
VK3AXB—J. Linden, 135 Hume St., Wodonga, 3690.
VK3AYE—L. A. Ball, 52 Shiels Tce., Casterton, 3311.
VK3AYF—S. Rayson, 1588 Dandenong Rd., Huntingdale, 3166.
VK3AYK—K. F. Price, 1 Valdale Crt., Heathmont, 3135.
VK3AZF—K. E. C. Gillon, Flat 1, 76 Roberts Ave., Springvale North, 3171.
VK3AZH—K. J. Horsfall, Flat 14, 51 Buckley St., Essendon, 3040.
VK3ZEP—H. F. Paton, Station: 49 Havelock Rd., Hawthorn, 3123; Postal: C/o. 18 Selwyn St., Hawthorn, 3123.
VK3ZHL—C. W. Gliddon, 9 Gloria Ave., Dandenong, 3175.
VK3ZIU—I. Marks, 13 Melosa Ave., East Brighton, 3187.
VK3ZIY—C. I. Yandell, Flat 2, 28 Donna Buang St., Camberwell, 3124.
VK3ZJO—E. G. Briggs, 563 Neerim Rd., Hughesdale, 3166.
VK3ZKL—A. Slamin, 15 Normanby St., Prahran, 3181.
VK3ZKO—R. J. Broughton, Flat 1, 32 Wattletree Rd., Armadale, 3143.
VK3ZLG—R. J. Green, 22 Shackleton St., Belmont, 3216.
VK3ZMM—I. W. Cerchi, Unit 2, 428 Riversdale Rd., East Hawthorn, 3123.
VK3ZOH—J. R. Hargrave, 74 Haydens Rd., Beaumaris, 3193.
VK3ZQA—E. M. Lane, 49 Albert St., Ararat, 3377.
VK3ZSL—A. Slarks, 13 Orchid Ave., Oakwood Park, 3175.
VK3ZSU—D. G. Politakis, 37 Hopetoun Ave., Morwell, 3840.
VK3ZTN—P. J. Solly, Station: Rainbow, 3424; Postal: P.O. Box 102, Rainbow, 3424.
VK3ZVN—C. Sawtell, 43 Clyde St., Box Hill, 3129.
VK3ZXF—R. H. Hudson, 16 Prince Edward Ave., McKinnon, 3204.
VK3ZXS—H. Smith, 32 York St., Strathmore, 3041.
VK3ZYI—S. Curtis, 437 Middleborough Rd., Box Hill, 3128.
VK3ZZR—R. L. Reid, 2 Ellen St., Springvale, 3171.
VK3ZZT—A. J. M. Scott, 21 McKean St., Box Hill North, 3129.
VK3ZZU—P. S. D. Edwards, 101 Main St., Blackburn, 3130.

VK5ZBT—A. F. Raftery, 22 Princess St., Croydon, 5008.

VK6AO—C. G. Andrews, 14 Curtis Pl., Melville, 6156.
VK6DB—D. F. J. Benck, 18 Omdurman St., Wagin, 6315.
VK6HJ—H. M. Smith, Station: 22 Lockwood St., Exmouth, 6707; Postal: P.O. Box 22, Exmouth, 6707.
VK6JL—J. L. Lewis, 111 Churchill Ave., Subiaco, 6008.
VK6JT—J. S. Brown, 92 Acanthus Rd., Riverton, 6155.
VK6JU—M. G. Burleigh, 147 Gloucester Cres., Safety Bay, 6169.
VK6LT—L. F. Toussaint, 19 Errinbee St., Riverton, 6155.
VK6ZEV—G. D. L. Armstrong, Station: Kojonup Rd., Katanning, 6317; Postal: C/o. Radio Station 6WB, Katanning, 6317.

VK8MR—M. D'A. Richardson, Station: 18 Mary St., Stuart Park, Darwin, 5790; Postal: P.O. Box 228, Darwin, 5794.
VK8ZCA—M. W. McLennan, 582 Fernau St., Nightcliff, 5792.
VK8ZEC—P. M. Van der Velden, C/o. N.T. Musical Pty. Ltd., 54 Cavanagh St., Darwin, 5790.

CANCELLATIONS

VK2GB—J. W. Birdsall. Not renewed.
VK2MB—H. T. S. Banks. Deceased.
VK2WZ—J. H. Lean. Not renewed.
VK2YK—C. A. Coyle. Not renewed.
VK2AHN—D. J. Murphy. Not renewed.
VK2AUO—R. A. Emmerton. Not renewed.
VK2ZEX/T—A. J. Brucesmith. Now VK2AD/T.
VK2ZOJ—A. H. B. Brodrick. Now VK2HI.
VK3CD—J. Rich-Phillips. Deceased.
VK3VJ—A. W. Adams. Now VK2II.
VK3ABQ—J. A. Moran (Sgt.). Transferred to Western Australia.
VK3AGS—G. E. Sheeran. Now VK2BGS.
VK3AIO—W. M. Ryan. Now VK4WR.
VK3AMR—J. A. Howie. Now VK2AYH.
VK3ZGQ—D. K. W. Bradbury. Transferred to New South Wales.
VK3ZJF—J. A. Taylor. Now VK3NS.
VK3ZMD—J. F. Davis. Transferred to New South Wales.
VK3ZOF—W. E. Metzenthen. Overseas.
VK3ZQZ—J. McL. Bennett. Now VK3AQP.
VK3ZYR—S. Rayson. Now VK3AYF.
VK3ZYW—R. W. McLean. Now VK3AOR.
VK5AJ/T—R. A. Hipwell. Transferred to Victoria.
VK5LV—J. R. Godson. Transferred to Queensland.
VK5LW—J. R. Godson. Ceased operation.
VK5ZJK—M. W. McLennan. Now VK8ZCA.
VK5ZKA—P. M. Van der Velden. Now VK8ZEC.
VK6AN—F. W. Noble. Left country.
VK6GH—W. G. Hayman. Deceased.
VK6ZAZ—C. G. Andrews. Now VK6AO.
VK6ZDN—J. S. Brown. Now VK6JT.
VK6ZDR—R. C. Speer. Transferred to New South Wales.
VK6ZEC—D. F. J. Benck. Now VK6DB.
VK6ZGL—J. L. Lewis. Now VK6JL.
VK6ZLT—L. F. Toussaint. Now VK6LT.
VK7OZ—W. E. Dixon. Ceased operation.
VK8ZDE—H. W. Spaulding. Transferred to New South Wales.
VK8ZMR—M. D'A. Richardson. Now VK8MR.

GELOSO CALENDAR '69

R. H. Cunningham Pty. Ltd. are making available free on request the Geloso calendar for 1969. Beautifully printed in full color, the calendar shows historic buildings and places in Italy. Requests should be addressed personally to Mr. R. H. Cunningham, 608 Collins Street, Melbourne, Vic., 3000.

THE QUESTIONNAIRE

(Continued from Page 7)

time and then through again, but please, no box Brownie shots or similar. Find a competent photographer (there will be one in your Division) and send us good clear prints, preferably no smaller than 10" x 8", sharply focused, and with reasonably good contrast.

We were surprised at the number of requests for the history of Amateur Radio in Australia. The Federal historian, Mr. George Glover, has been working on this project for several years, collating and checking through old records, and when last contacted on the matter was able to report considerable progress having been made. His writings cover the first fifteen years and in draft form, copies have been sent to many old-timers for comment and additions or corrections that they can recommend. We expect to be making full use of this work in due course.

A common request was for more technical articles. Here we are largely controlled by what we receive, and despite some of the comments, very few are rejected. Over the last five years only ten articles submitted have not been used, one of these because the author has never completed it. From the replies we now know that the articles we have published are: too long, too short, too technical and too simple, give too much detail and too little detail. In other words, we have no hope of winning. We must assume that a magazine published for Amateurs will be read by Amateurs, who by the very virtue of passing a written examination to obtain their licence have a certain basic level of knowledge on the subject, and this should be the minimum level to which we publish. On the other hand, we are faced with finding the maximum level, without getting too high for the majority of readers. To this question we have no answer, as there is always a percentage of readers anxious to improve their knowledge of the subject, and this is one of the prime objectives of the W.I.A.

To produce all the articles for which we are asked, we would need a laboratory and a large staff. We now believe there is more than sufficient talent within our own ranks to produce all the material we could ever use and we refer you back to the policy item reproduced earlier in this report.

As a guide to prospective sub-editors, we are looking for articles on equipment for the u.h.f. frequencies. We are now aware that considerable work is being done on 432 and 1296 Mc., but we have not been favoured with any articles.

There will be no report next month, as time will have to be devoted to the annual report for the Federal Convention. With the May issue, we hope to have a look at the frequencies and modes being used, and, space permitting, a survey of a few more of the suggestions received.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

DX-PEDITION TO ANDORRA

Editor "A.R.," Dear Sir,

Last summer I was active from the principality of Andorra with the call PX1FD. I now intend to re-activate this call about Easter, probably from 5th to 11th April.

During July/August last we formed a team with PX1KT and PX1YY. All arrangements are being made for PX1YY to accompany the DX-pedition in April and most probably PX-1KT will also be on the air. It could thus be that the station would be operated around the clock.

Further details are not yet determined precisely, but will be known definitely by the end of January/early February. Licences are being asked for and will probably be granted in due time.

Could you possibly insert a few lines in the next issue of "Amateur Radio" to inform the VK Amateurs about this opportunity.

I shall, of course, keep you posted on all details (frequencies, time scheduling, transmitters used, etc.).

Thanking you beforehand for your collaboration, I hope we can avail ourselves to make many solid QSOs between VK and PX.

My best 73 in the meantime.

—Guy Gillain, ON5FD.

1296 Mc. TESTS

Editor "A.R.," Dear Sir,

I wish to advise you of recent experiments which have been carried out on 1296 Mc. band. On Sunday, 29th December, 1968, during the New Year's Field Day Contest, while portable at Mount Gibraltar, near Bowral, I contacted VK2ZAH at Hornsby—a distance of 65 air miles. The portable gear used consisted of completely home-made equipment, running from a transistor power supply with 9 watts output at 1296 Mc. from a veractor; receiving equipment consisting of a crystal locked converter into a tunable i.f. The antenna used was a twin 10-turn helix a wavelength apart, with a solid metal reflector.

The gear at Barry's end (VK2ZAH) was running 8 watts output from a 2C39, antenna, 4 ft. dish, crystal locked converter to an AR7.

Signal reports exchanged were 5 and 6 and 5 and 5. A very good contact, which prompted us to try our luck a little further the following week-end, so on Sunday, 5th January, 1969, when we proceeded to a mountain, 132 road miles from Sydney, we found it was possible to work Bill VK2ZAC over a path of 71 air miles from Shooter's Hill to Narwee. Signal reports were 4 and 5 and 5 and 6, the portable gear being the same as used in working Barry. Bill used a veractor multiplier with seven watts output to a quad helix with a crystal locked converter to BC348.

Both these contacts have been confirmed and distances have been agreed upon by both parties.

—R. C. F. Norman, VK2ZCF.

FOREIGN STATIONS AND N.F.D. CONTEST

Editor "A.R.," Dear Sir,

I would be obliged if you would find space in "A.R." to print the following, which I see as a constructive attempt to bring to the notice of members a ridiculous situation that has developed in respect of the Memorial to the late John Moyle, whom I held in the highest regard.

I have read in the columns of "A.R." various letters pertaining to the N.F.D. Contest, those for and against its coincidence with the A.R.R.L. Contest. Insofar as they conflict, these worthy letters are revelant. They do, however, miss the wood for the trees.

All those stations that worked foreign stations and included these stations in their scores must, under Rule 10, disqualify themselves. Whether it transpires that this is done formally or not under the rules as they stand morally these stations were outside the Contest, and sought to seek an advantage over other rule-abiding stations.

The Objects of the Contest make it clear that VK stations are to work VK stations only.

The Objects say: "The operators of Portable and Mobile Stations within all VK Call Areas will endeavour to contact other Portable/Mobile and Fixed Stations in Australia and Overseas Call Areas."

Rule 8 defines a Call Area. Rule 8: "The following shall constitute Call Areas—VK1, VK2, VK3, VK4, VK5, VK6, VK7, VK8, VK9 and VK0."

Under the Rules there is no place for a G3 call area or a W6 call area, etc. Where the Objects speak of "Overseas Call Areas" they clearly refer to those Call Areas being VK Call Areas without Australia, i.e. not being within Australia proper, e.g. Willis Is., Papua, etc.

One could quote analogy after analogy from life where self interest conflicts with the social mores and social values as laid down in various Statutes, Ordinances, Orders, Rules, etc., but the fact of the matter remains the same, a Rule, etc., is either observed as it is laid down or it has not been.

Any discussion that comes later will come after the fact that the rules of the contest have been blatantly broken, mostly by ignorance and scant reading of the Rules, it is hoped, but nevertheless broken.

It is now up to the Contest Committee to decide what to do, and the best of luck to them, because whatever it is, will it be popular with everyone?

—R. F. Meany, VK3HA.

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"CQ" SSB AWARD RULES

The 2 x SSB Certificate will be issued to any licensed Amateur station presenting proof of contact with 100, 200 and 300 countries. Stickers will be issued for each additional 25 countries confirmed up to 300, thereafter they will be issued in increments of ten. This proof shall consist of a proper QSL card to be checked by the 2 x SSB Award Manager or by one of the authorised checkpoints for "CQ" DX Awards. (W.I.A. Awards Manager in VK.)

1. All applications should be submitted on official application form "CQ" 1067. This form can be obtained free by sending a self addressed stamped envelope to the 2 x SSB Award Manager.
2. All QSL cards must be clearly marked 2 x SSB, and be in alphabetical order.
3. Claims for 100 countries must be included in the first application.
4. Confirmations must be accompanied by a list of claimed countries and stations to aid in checking and for future reference.
5. Include with the application eight IRCs to defray cost of the certificate. Sufficient postage for the return of confirmations must be included with a self addressed stamped envelope with each application. When sending for endorsements, two IRCs or a self addressed stamped envelope should accompany each application.
6. All contacts must be with licensed land based Amateur stations working in authorised Amateur bands.
7. All contacts submitted by applicant must be within a 250-mile radius of the original location.
8. Any altered or forged confirmations will result in permanent disqualification of the applicant.
9. Fair play and good sportsmanship in operating are required of all Amateurs working toward 2 x SSB Award. Continued use of poor ethics will result in disqualification.
10. Once a country has lost its status as such, it will automatically be deleted from our records. There will only be a current country count.
11. Decisions of the "CQ" DX Awards Advisory Committee on any matter pertaining to the administration of this award shall be final.
12. All applications should be sent to: Louise Rippe, W8HDB, 2 x SSB Award Manager, 3785 Susanna Dr., Cincinnati, Ohio, U.S.A., 45239.

VK applicants should forward their QSLs and check-lists to W.I.A. Awards Manager, who will certify applications and return cards.

(Reproduced by permission of the DX Editor "CQ" Magazine.)

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CONTEST CALENDAR

1st/2nd Mar.: 35th A.R.R.L. DX Test (Phone Section).
1st/16th Mar.: I.A.R.C. C.W./R.T.T.Y. Contest.
8th/9th Mar.: 32nd B.E.R.U. Contest (R.S.G.B., C.W.
15th/16th Mar.: 35th A.R.R.L. DX Test (C.W. Section).
29th Mar./13th Apr.: I.A.R.C. Phone Contest.
5th/6th Apr.: Polish DX C.W. Contest.
12th/13th Apr.: "CQ" W.W. W.P.X. S.S.B. Contest.
19th/20th Apr.: Helvetia 22 Contest.
26th/27th Apr.: P.A.C.C. C.W./Phone Contest.
25th/26th Oct.: "CQ" W.W. DX Contest—Phone Section.
29th/30th Nov.: "CQ" W.W. DX Contest—C.W. Section.

—D. Rankin, F.E.

1969 I.A.R.C. PROPAGATION RESEARCH COMPETITION

(A DX CONTEST WITH A PURPOSE)

RULES

Contest periods: This year, the contest will be run in two sections. CW/RTTY from 0001 GMT, 1st March, to 2400 GMT, 16th March. Phone from 0001 GMT, 29th March, to 2400 GMT, 13th April.

Objective: The objective remains the same. Work as many stations in as many different CPR Zones as possible. Countries do not count in the score. Work your own Zone only once for Zone credit.

Bands: All bands 1.7 through 30 Mc.

Exchange: RS or RST report plus your CPR Zone number.

Duplicate QSOs: You may work the same station as often and for as long as you wish. When a single QSO exceeds 6 minutes, a new log entry shall be made for each 6 minutes or part thereof.

Logging: Use **GMT only**. Observe rule for duplicate QSOs. QSO may be made in another contest or with a station not participating in this test, provided all necessary information is logged.

Scoring: One point for each QSO except no contact credit for working stations in your own Zone. See rule on objective. Multiplier of one for each Zone on each band. You may work one station in your own Zone for Zone multiplier only. Total score is the sum of all contacts multiplied by the total Zones for all bands.

Entry Classes: Entries will be accepted in the following categories:

Single Operator—Single Band.
Single Operator—All Bands.
Multi-Operator—All Bands.
Radioteletype—All Bands.
Mobile—All Bands (includes all categories of mobile).
All Events—This is a new category. You may submit a total score for all modes and bands.

Awards: Winners in each category in each Zone will receive a suitable certificate or other award. All entries of 100 or more valid QSOs will receive a CPR Certificate of the appropriate grade.

Logs and summary sheets may be obtained from I.A.R.C., Box 6, 1211 Geneva 20, Switzerland, or from the Chairman of the Contest Committee. Send all logs to the following address unless otherwise instructed. Logs must be posted prior to 1st June, 1969.

L. M. Rundlett, Chairman,
I.A.R.C. Contest Committee,
2001 Eye Street, N.W.,
Washington, D.C., 20006.

— • • • —

"CQ" WORLD WIDE WPX SSB CONTEST, 1969

PRECIS OF RULES

Time: 0000 GMT, 12th April, until 2400 GMT, 13th April.

Single operators can only work a maximum of 30 hours within the above stated 48 hours. The 18 hours of non-operating time must be shown in the log and may be taken in up to five periods during the contest. Multi-operator stations can operate the full 48 hours.

Bands and Mode: 3.5 Mc. to 28 Mc. S.S.B. only.

Exchanges: 59001, 59002, etc.

Scoring: Three points per contact with stations on different continents. One point per contact with stations on the same continent. No points are allowed for contacts with stations in the same country but are permitted for multiplier purposes.

Multiplier: Sum of the number of prefixes worked multiplied by the number of contact points. N.B.—A prefix may be counted only once during the contest irrespective of the band worked. W2, WA2, KA2 are different prefixes.

Logs: To "CQ" WPX Contest Committee, 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050, U.S.A.

N.B.—Full details appear in March "CQ" magazine and serious contestants are recommended to read these in detail.

DX

Sub-Editor: PETER NESBIT, VK3APN
32 The Grange, East Malvern, Vic., 3145
(All times in GMT)

ASSORTED

Steve VK8CC announces that he hopes to visit St. Brandon and Rodriguez Is. some time during the period March to May, before he returns to Europe on vacation. Call signs will be VQ8CCB (St. Brandon) and VQ8CCR (Rodriguez). 160 through 10 metre operation is planned with particular attention to be given to the l.f. bands to help those who are trying for 5BDXCC. QSL direct to Box 14, Curepipe, Mauritius. Three IRCs are required for an airmail reply, otherwise cards will go via the Bureau.

Rumors are brewing for an early March DX-pedition to Cocos Is. (TI9), by TI2RE, CMB, CF, 4JP and maybe some W6.

VR6TC is QRV Tuesdays; 1st Tuesday in each month on 21060 c.w. from 2130z onwards, other Tuesdays 21350 s.s.b. from 2200z. For a sked write well in advance to W5OLG, Box 261, Grapevine, Texas, 76051. State which Tuesday you will be on freq. Wait for Tom to call you.

ZL5AA/3: Ian ZL5AA has arrived at Campbell Is. where he hopes to operate for two or three months.

It is alleged that French licensing authorities have issued no licences for operation from Clipperton Is. While on the topic, W1MQT (who is **not** QSL manager for TA3AB) says that Frank, the operator of TA3AB, has no licence to operate from Izmir. He says that the Govt. of Turkey does not permit American personnel to operate Amateur stations there. (DX News.)

All is not lost, however. A.R.R.L. has advised DJ1QP that DXCC credit will now be granted on the cards of his recent GC5AET operation. Up to now about 1,000 direct QSLs have been answered.

Don VE6AJT was very active as VR5AE, but has apparently returned home since the FW-8DY operation because of financial problems. The ZM7 permit will be valid for one year.

Rhodes Island activity is planned for this Easter by Jim SV0WN and Don SV0WI. The anticipated frequencies are 14195, 21245 and 28545; listening 5 kc. up. Keep an ear out for Don and Jim.

Dick GC8HT hails from Guernsey in the Channel Islands. To help anybody interested in working this rare country/prefix, Dick has available a list of skeds, i.e. times and frequencies that he will be active on and looking for contacts. The sked list covers the whole year, with skeds from 160 right through to 10 mx. If you are interested in obtaining a list, send Dick an s.a.e. and an IRC and he will reply via airmail. Dick's address is: R. Taylor, La Cour de Longue, St. Saviour's, Guernsey, Channel Islands.

Skeds for March are: 10th, 14186 s.s.b. at 0730z and 14043 c.w. at 1000z. 17th, 21013 c.w. at 0730z and 21343 s.s.b. at 0900z. Altogether 21 skeds are listed for March, but the ones listed here are the best for VK. On the average, Dick receives 100 cards per week, but peak weeks have exceeded 200. Threfore, to be sure of reciving a QSL, the following must be observed: Write the month in words, not as a number; use GMT time; and send a self addressed envelope with one IRC. (These rules could apply when seeking a reply from any rare DX station. Check at the Post Office to see how many IRCs are needed for an airmail reply, if wanted.)

QSL MANAGERS

CR6LF—W3HNK
CR7GA—WA3HUP
EP2FD—WA5ERS
FP0AA—VE1AKT
HB0LL—DL7FT
HS3AL—W3KT
KV4EY—W3HNK
KW6AA—WB6YCT
PX1PA—DL7FT
SV0WN—K3EUR
TA1RF—DJ4SK
TA2E—VE3ABG
TU2AY—DL7FT
VK9RJ—K6UJW
VK0VK—VK6VK
VP1RC—WB6EFA
VP1VR—W4VPD
VP2DAJ—WB4EFE
VP2GRN—W4YHB
VP2GSM—W4YHB
VP2SAB—WB2WOW
VP8KL—WA3IKK
VR5AE—VE6AO
VU2AJW—WA6NFC
XE1PJL/XF4—XE1J
XE0LOW—WB2GQK
ZD8AB—W8BMS
ZD8JL—W9JVF
3A2CU—DL7FT
4TA4OS—OA4OS
5R8AM—K2KTX
5R8AS—W6FQ
5V4AP—DL1HH
5V4EG—DL1HH
5V4JL—DL1HH
7P8AR—W4BRE
9K2BV—W5EGR
9X5AA—W1YRC
A2CAU—Box 200, Francistown, Botswana.
VR7JE—Box 2, I.L.E., Zambesia, Mozambique.
CR8AI—L. Fernandes, Dili, Portuguese Timor.
CT2AK—Box 143, Ponta Delgada, S. Miguel.
DX1NY—B. Smith (K8LNY), C/o. S.E.A.C.R., A.P.O., S.F., 96274.
ZS2MI—Box 838, Germiston, S. Africa.
KV4CI (direct only)—H. Miller, Box 1853, St. Thomas, Virgin I.

ACTIVITIES

160 metres often open to DX regions according to George L6042. He has been hearing the following: K2GNC 1801 kc. 1142z, W6QHQ 1992 kc. 1420z, JA2CLI 1908 kc. 1506z. George says "Conditions right on the button during the Jan. 11 Trans-Pacific Test. Heard W5HPC, W8ANO, W8GDQ (579), W4BGO, K2GNC, W8KW?, and some weaker ones. K2GNC and W4BGO continuously called VK5KO, who apparently had a good signal over there, but John didn't hear them." (Thanks George)

Further reports of how good 20 mx has been come from Fred VK4RF. A large list of 63 call signs worked (s.s.b.), every single one a winner, bears this out. Unfortunately space does not allow publication of the whole list, but a few picked at random are 5A3TX, 7Q7AM, TU2AY, TJ1AU and FP8CY. Clearly now is the time for 20 metres. (Thanks Fred.)

THE XL OPERATOR CLUB

The membership of this fraternity is based on long term service and excellent achievements in the field of Amateur Radio. The requirements are intensive activity over many years on various bands.

A minimum of 40 points is required for membership. The points may be earned as follows:

(1) Five points for the first full 10 years the applicant has been licensed, PLUS three points for each five years thereafter.

(2) Five points for the first 200 DXCC countries confirmed, PLUS three points for each additional 50 countries confirmed.

(3) Five points for each 100 DXCC countries confirmed on EACH of the 28, 21 and 14 Mc. bands.

(4) Three points for each 50 DXCC countries confirmed on EACH of the 7 and 3.5 Mc. bands.

(5) Two points for each 20 DXCC countries confirmed on EACH of 1.8 Mc. and v.h.f./u.h.f. (v.h.f./u.h.f. is considered as one band).

The country totals are calculated regardless of the mode of operation. A.R.R.L. DXCC rules apply for counting the countries. If you can claim at least 40 points, send your application to Award Hunters' Club International, C/o. OH2YV, J. Velamo, Isokaari 4-B-30, Helsinki, Finland. Include your call, name, address, plus (1) the date of your first transmitting licence, (2) the DXCC score confirmed (or credited by A.R.R.L.), (3) number of confirmed countries per band. Finally, certify personally that the information presented is true. No other certification is necessary; the word of XL operators is trusted. If false information is given, it will spoil the Ham Spirit. Enclose sufficient return postage (there is no membership fee.)

WORLD WIDE POLL OF MOST WANTED COUNTRIES

Readers are requested to send to G. Watts, 62 Belmore Road, Norwich, Nor. 72-T, U.K., a list of your "most needed" countries (not more than 25). As the G. Watts bulletin "DX News" is read by most of the world's top DXers, the results will be a useful guide to intended DX-peditions. The results will be published in this column as soon as they come to hand, listing the countries in order of priority; thus providing valuable information for those making DX-peditions. It is in the interest of all readers to participate in this Poll. (Anyone wanting to save postage can send their list to me and I will airmail it to G. Watts.)

SUMMARY

More activity reports are needed. It is a pity that out of so many readers only two can be bothered sending in reports. Surely there are others who have had interesting experiences on the air that others would like to hear about. How about it, chaps?

Acknowledgments to DX News, LIDXA, ZL2AFZ, VK3VK, OH2YV, VK4RF and GC8HT. 73, Peter VK3APN.

— . . . —

FAIRCHILD APPOINTMENTS

Recent additions to Fairchild Australia Pty. Ltd. sales engineer force include Robert C. Hunt who will assist Phil Cohen in Melbourne, and Brian Shirley in Sydney who will assist David Finch.

VHF

Sub-Editor: CYRIL MAUDE, VK3ZCK
2 Clarendon St., Avondale Heights, Vic., 3034

Another summer season is almost over and the DX reports are very poor. Judging by the numbers exchanged by those taking part in the Ross Hull Memorial V.h.f. Contest and the poor DX conditions this year's scoring will be one of the lowest on record.

I would appreciate news from all other States for this page in "A.R." but please keep it to material that is of interest to all readers and not of local gossip that is out of date by the time I receive it. Closing dates for copy for the V.h.f. page of "A.R." for the next few months are: May issue, 28th March; June issue 30th April; July issue, 30th May.

73 until next month, Cyril VK3ZCK.

V.H.F. BEACON TRANSMITTERS

GB3CTC—Cornwall, England—144.10 Mc.
SM4MPI—Sweden—145.96 Mc.
ZD3AA—Cook Island—52.032 Mc.
ZE1JZA—Rhodesia—432,048, 144.016 Mc. 144.015
JA4, 6, 8, 9IGY—50.50 Mc.
VK5VF—53.00 Mc.
VK6VF—52.006, 144.198, 432.59 Mc.
VK3 ATV0—51.76 Mc.
GH1MB—Malta—70.10 Mc.
ZB2VHF—Gibraltar—70.26 Mc.
ZD7WR—St. Helena—28.992 Mc.
JA1IGY—51.99 Mc.
VK4VF—144.40 Mc.
VK7VF—Devonport—144.90 Mc.
VK6BF (?)—Albany—144.50 Mc.
VK4 TVQ0—51.74 Mc.

These beacon frequencies were compiled from data supplied by George VK3ASV, ex VK3ZCG and overseas magazines.

Any information regarding these or any other beacons that you may know of will be gratefully received and acknowledged in this column.

VICTORIA

The DX hounds on both 6 and 2 metres have had a big set-back over the past few months. Early in December conditions started to look very bright, with all VK States and a few JAs, but alas, come Christmas and the New Year, the Ross Hull Contest and little or no DX to be found.

Since then 2 mx has improved a little, but DX on 6 is very sporadic. The majority of openings in the 52-54 Mc. band appear to be in the mornings, early afternoon and again in the evening when it is almost impossible for most Melbourne chaps to fire up on 6 mx.

An interesting point on the modes used, s.s.b. is on the increase with a large number of VK2s, 5s and 6s using this mode. Here in VK3 there are only a couple of Amateurs regularly using s.s.b. on this band.

Wide and narrow band f.m. is becoming popular on 6 mx, especially in areas where t.v. channel 0 is in use. The net frequencies in most common use are the International 6 mx f.m. net on 52.525 Mc. and 52.656 Mc., both of which are vertically polarised.

Band reports: 6 mx is generally poor, but for DX hunters and those not pestered by Television Indians, the evenings can be quite interesting.

2 mx is improving with DX to northern and central VK3, southern VK2, VK5 (Mt. Gambier and Adelaide), and to northern Tasmania. Most of these openings are at night.

Reports have been received of stations in the Melbourne and Geelong areas having heard some ZLs at fair to good strength, but alas no ZLs have been reported as being worked.

70 centimeters reports suggest that this band is superior to 2 mx. Several stations now operate mobile with a single cloverleaf for the radiator and QQE03/20 tripler as the transmitter, the exciter being the 2 mx mobile rig. This band is also becoming popular on field days.

Many new call signs have been heard on this band lately, but there still appears to be a shortage of receiving converters, judging by the number of cross band contacts being made. DX has been reported from VK7, VK5, VK2 and inland VK3.

Fox Hunts.— Visitors to VK3 and those in VK3, the regular Fox Hunt night has been changed to the **fourth Friday** in each month instead of the fourth Wednesday. 73, Robert VK3AUR.

SILENT KEY

It is with deep regret that we record the passing of the following Amateurs:

VK5NK (ex VK8NK)—
Ralph James Knight.

VICTORIAN DIVISION

STATE CONVENTION

will be held on

15th and 16th MARCH

at

BENDIGO

Convention Dinner, Sunday Lunch and Afternoon Tea, $4.50, or Sunday activities only, $2.

Talk-in facilities on Channel A FM. Trade Displays, Competitions, and Entertainment.

Reservations to be made with Bill Sadler, VK3AMZ, 504 McIvor St., Bendigo, Vic., 3550, no later than 7th March, enclosing $2 per head deposit.

TOWNSVILLE

Amateur Radio Club

The **1969 Class** for those interested in obtaining an **Amateur Licence** begins on:

Saturday, 8th March, 1969.

Time: 8.30 a.m.

Location: 4TO Auditorium.

Class Instructor: L. Noseda, VK4EX.

For further information contact:
P. J. Lindsay, VK4ZPL/T, Tel. 6161

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FEDERAL

RESERVATION OF CALL SIGNS

Mr. Carroll, Controller, Radio Branch, P.M.G's Dept., during a recent discussion with Federal Executive, pointed out that where a licensee has died, it is policy of the Department not to re-issue his call sign for five years, unless in special circumstances. Where very special circumstances exist, call signs are not re-issued for ten years. In the event of unrenewed call signs, these are reserved for two years where no special reasons are given, but consideration will be given to the reservation of call signs for greater periods if, for example, a licensee is transferred Interstate or overseas, but intends to return to his original call area.

SPECIAL INTERSTATE CALL SIGNS

We have been informed by the P.M.G's Dept. that it has been decided to set aside a block of call letters from which allocation may be made to Amateur licensees who are subject to frequent Interstate transfers in their work and desire to retain the basic call letters by which they are known throughout the Amateur fraternity. It will, of course, be necessary for the numeral denoting the particular State to be changed when such transfers are effected and application must be made to the Superintendent in the State in which the station is to be established before removing it to another address, in accordance with the provisions of paragraph 87 of the Amateur Handbook.

Call signs are reserved for use in the various States are as follows:—

N.S.W.	VK2CAA - VK2CBZ
Vic.	VK3CCA - VK3CDZ
Qld.	VK4CEA - VK4CFZ
S.A.	VK5CGA - VK5CHZ
W.A.	VK6CIA - VK6CJZ
Tas.	VK7CKA - VK7CKZ

An applicant for a call sign from the abovementioned series will be required to furnish satisfactory evidence that his employment is likely to result in his being transferred Interstate at some future date.

The abovementioned arrangement is being introduced on a trial basis for three years and, of course, will apply to full privilege licence holders only.

RECIPROCAL LICENSING IN FINLAND

We have received from Niilo OH2XK, the Secretary of S.R.A.L., some information sheets about regulations for Amateur Radio in Finland. Any Amateurs intending to travel to Finland can obtain such information from F.E. or write to S.R.A.L., P.O. Box 10306, Helsinki 10, Finland. In short, OH licences will be granted to the citizens of Australia as well as about 12 other countries.

JAMBOREE-ON-THE-AIR

The Boy Scouts World Bureau indicates that the 12th Jamboree-on-the-Air will be held in the third week in October, thus making the date for 1969 as 18th-19th October. National organisers of J.O.T.A. may be interested to contact L. Jarrett, of the World Bureau, on the 10 and 15 metre bands most week-ends using his HB9AMS call sign.

HAMADS

Minimum $1 for forty words. Extra words, 3 cents each.

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Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at **P.O. 36, East Melbourne, Vic., 3002,** by **5th of the month** and **remittance must accompany** the advertisement.

AIKI 707 professional delux, hi-fi Tape Recorder and reproducer, in as new condition. Dual track, single lever speed change mechanism, automatic shut off, loudspeaker, tape index counter, large VU meter. Can be used for making recordings of excellent quality from mic. or extended program sources, AM/FM radio tuners, record players, TV sets, etc. May be used in either vertical or horizontal position. Complete with dynamic mic. 5 in. spool, service tables, instruction book. Spec. 30 to 12000 c.p.s. at 7.5 in./sec. plus or minus 3 db., S/N ratio more than 50 db. Dual track record play and erase heads, max. reel size 7 in. Output power 5 watts max., power requirements 100/230v. 50 or 60 cyc. $140. A. Swinton, Kulnura, N.S.W., 2251. Phone 261.

FOR SALE: Apache Tx, five-band with SB-10 S.s.b. Adaptor, excellent condition, $200. BC348 Receiver, p.s. and speaker, $60 o.n.o. VK3ADY, Phone 88-4005 (home), 62-6025 (bus.) (Melbourne).

FOR SALE: Collins 302C-3 RF Wattmeter. Switch for forward and reflected power, dual scale. 200 watts and 2000 watts, very accurate, as new. $95. A. Swinton, Kulnura, N.S.W. VK2AAK.

FOR SALE: FL100B Transmitter, five-bands, excellent condition, $225. Also Star SR600 Receiver, double conversion on 80 metres, triple conversion on other bands, pre-selector, 1st local oscillator xtal controlled, beautiful condition, twelve band positions, $240. VK3CH, A. Nunn, 10 Arcady Gr., Vermont, Vic., 3133.

FOR SALE: Galaxy V. (less power supply), Galaxy Remote VFO, Heath SB200 Linear, $675. R. Mirdas, Box 1277, Canberra City. Phone 49-2649 (days).

FOR SALE: Hi-Gain 204BA 4-element 20 metre beam. New, still in box, $140. R. Mirdas, Box 1277, Canberra City.

FOR SALE: Model 32S3 Collins Transmitter, latest model, top notch condition, as new. A highly flexible transmitter, 3.4 to 29.7 Mc., p.e.p. 175 w. input, 100 w. output. Grid blocked keying with adjustable soft or hard output, usable for RTTY. Dual conversion, Collins ALC and inverse feedback. CW spotting control allows zero beating with incoming signal. Fitted with Collins mechanical filter, bandswitch, etc. 11 selectable crystal positions in 200 Kc. segments. Very high stability, 100 cyc. after warm-up, easy access. Front panel selection provides optional transceiver operation. CW sidetone for monitoring in receiver. In all, a very high quality transmitter. $650. A. Swinton, Kulnura, N.S.W., VK2AAK.

FOR SALE: Model 62S-1 Collins Transverter for use on 2 and 6 metres by merely pressing a switch to change from h.f. In-built power supply, 160w. p.e.p., 4X150 final on VHF. Any mode of operation—SSB, AM, CW and RTTY, as determined by exciter. Ultimate in frequency stability, 23 switchable crystals 0.005%, 200 Kc. increments 143.6/148 Mc. and 49.6-54.2 Mc. Power output 65w. p.e.p. $680. A. Swinton, Kulnura, N.S.W., VK2AAK.

FOR SALE: Webster Band-Spanner whip. Like new, $35. R. Mirdas, Box 1277, Canberra City.

KW77 Triple Superhet., Amateur Bands Rx, 1.8-29.7 Mc. in seven bandspread bands, CW, AM, SSB, xtal cal. fast/slow AGC, $200 or near offer. R. Collins, VK5RY, 5 Dean Court, Modbury, S.A., 5092. Tel. 64-1210.

SELL: Eddystone EC10 fully transistorised s.s.b. and a.m. Communications Receiver. Brand new in original carton with instruction manual. $175. Roth Jones, 1 Albert Road, Melbourne, Vic., 3004. Phone 26-6911.

SELL: SB200 with spare set of valves, $180. Drake TR3 Transceiver with remote VFO, power supply, plus spare set of output valves, $550. SBE34 Transceiver, operates 240v. a.c. or 12v. d.c., microphone and cables, spare set valves and transistors, $350. H. G. Wilson, 31 Glenview St., Greenwich, N.S.W., 2065. Telephone 43-2427.

SELL: 400w. 3-band Linear, g.g. 811As, a.c. p.s.u., $65. 160 mx Transceiver, 150w. a.m., needs separate p.s.u., $25. Channel A FM Base Station, A.W.A. 40w., a.c. p.s.u., control unit, $45. MR10A, Channel A and B, complete mobile installation, $50. VK3AST, Phone 787-2318.

WANTED: Johnson Matchbox or Millen Transmatch. Must be in excellent condition. Ph. 86-5321 Ext. 388 (business), 878-4939 (private). P.O. Box 69, Kew, Vic., 3101.

WANTED TO BUY: General coverage Communications Receiver, AR7 or similar. Condition and price to P. W. Curran, Kilmany P.O., Vic., 3848.

WANTED: Traps 10M and 15M for Hy-Gain TH4 Tri-Band Beam. Replacements for damaged units. Any number will help. Even one. Also want Rx FR100B, SX122, SX117, SX100, or similar. Paul Rodukoff, 21 Derby St., Hawthorne, Qld., 4171.

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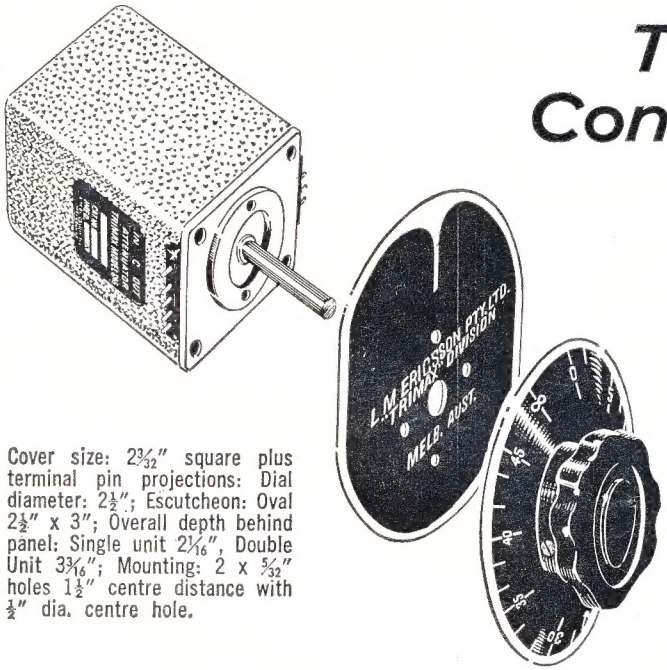

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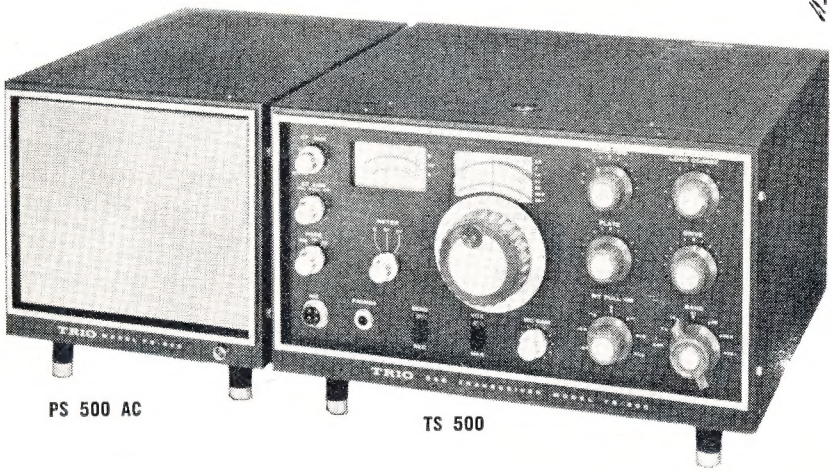

PS 500 AC

TS 500

SPECIFICATIONS:

Frequency:	80m Band	3.5-4.0 MHz
	40m Band	7.0-7.5 MHz
	20m Band	14.0-14.6 MHz
	15m Band	21.0-21.6 MHz
	10m A Band	28.0-28.6 MHz
	10m B Band	28.5-29.1 MHz
	10m C Band	29.1-29.7 MHz

Communication Method: SSB (A3j)
AM (A 3H)
CW (A1)

Maximum Input Power: (Xmitter final stage) 200W (PEP)

Standard Input Power: (Xmitter final stage) 180W (PEP) 120W on 28 MHz band only

Antenna Input Impedance: 50-75 ohm

Carrier Suppression Ratio: More than 40 dB

Single Side Band Ratio: More than 40 dB

Mic. Input Impedance: High impedance (dynamic or crystal mic. recommended)

Xmitter Audio Frequency Characteristics: 300-3,000 Hz (-6 dB)

Receiver Sensitivity: 1μV S/N 10 dB (14 MHz)

Receiver Selectivity: 2.7 kHz (-6 dB)
5.0 kHz (-55 dB)

Spurious Rejection Ratio: More than 45 dB

Image Ratio: More than 60 dB

Undistorted Power Output: More than 1W

Receiver Output Impedance:
SP 500 ohm
PHONE 8 ohm

Power Consumption (using PS-500AC): 450W (At maximum power output)
250W (Receiving Mode)

Tubes and Transistors used:
17 TUBES, 3 TRANSISTORS, 15 DIODES

Dimensions: W: 13⅛"; H: 8$\frac{11}{16}$"; D: 11$\frac{15}{16}$"

Weight: 17.6 lb

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SSB — AM — CW
80 Metres to 10 Metres

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- Stability better than 100 cycles. "Vackar" type VFO. Voltage regulated power supply.
- Uses mechanical filter at 455 Kc. specially designed for SSB. Selectable upper or lower sideband. Carrier and sideband suppression 50 db. or more.
- May be connected with STAR SR-700A receiver for transceive operation.
- Fully adjustable VOX and ANTITRIP circuits for automatic transmission/reception.
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- T-notch filter provides better than 50 db. attenuation.
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- Output terminal on VFO for transceive operation.
- Product detector for SSB/CW. Diode detector for AM.
- Noise limiter with adjustable clipping level operates on AM, SSB and CW.
- Built-in 100 Kc. crystal calibrator (crystal included). Zero adjustment on VFO.
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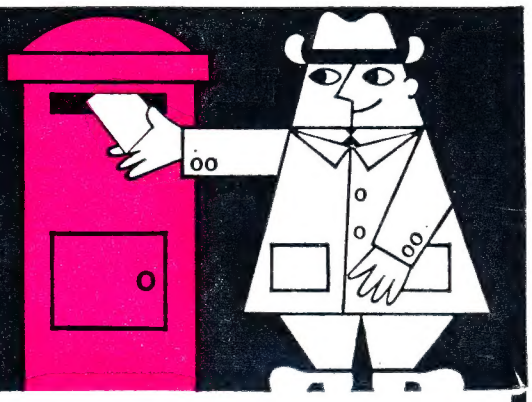

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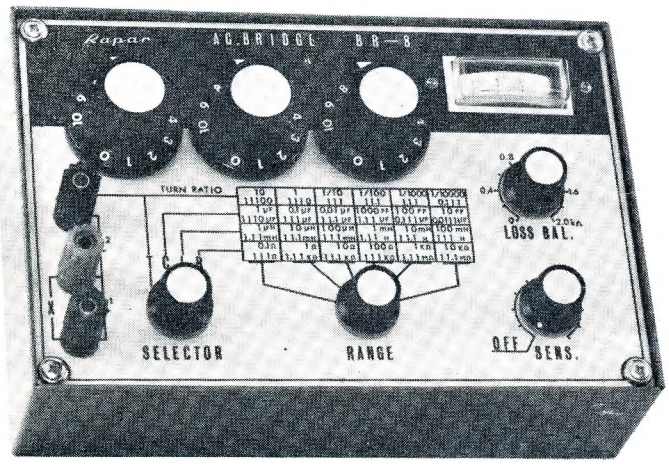

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Accuracy: 0.1 ohm to 10 ohm ±2% ±0.1 ohm
10 ohm to 5 megohm ±1%
5 megohm to 11.1 megohm ±5%

Inductance: 1 uH. to 111 H. in five ranges
Accuracy: 1 uH. to 100 uH. ±5% ±1 uH.
1 mH. to 111 H. ±2%

Capacitance: 10 pF. to 1110 uF.
Accuracy: 10 pF. to 100 pF. ±2% ±10 pF.
111 pF. to 111 uF. ±1.5%
111 uF. to 1110 uF. ±5%

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